

**VOLUME II-A**

**APPENDIX G  
ENERGY CALCULATIONS**

**FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
FORT RILEY, KANSAS**

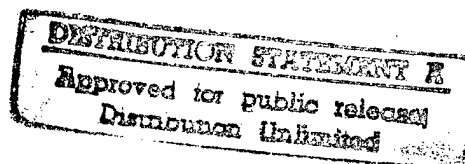
**ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)**

Prepared for

U.S. Army Corps of Engineers  
Kansas City District  
Kansas City, Missouri

Under

U.S. Army Engineer District, Mobile  
Indefinite Delivery A-E Contract  
Contract No. DACA01-94-D-0033  
Delivery Order 0001  
EMC No. 1406-001



December 1995

DZIC QUALITY INSPECTED 2

By

E M C Engineers, Inc.  
2750 S. Wadsworth, Suite C-200  
Denver, Colorado 80227  
303/988-2951



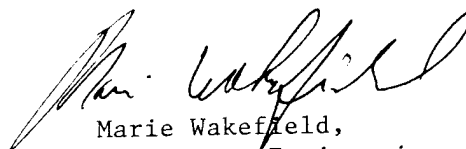


DEPARTMENT OF THE ARMY  
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS  
P.O. BOX 9005  
CHAMPAIGN, ILLINOIS 61826-9005

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Marie Wakefield,  
Librarian Engineering

**BUILDING 3  
POST CHAPEL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0003

BUILDING NAME: POST CHAPEL

Building UA:	2,020	CONDITIONED SQFT:	4,340
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	9 SANDSTONE BLOCK	CHURCH	0700-1800	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	4,800
%QA:	15%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0003

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,725.94	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.52	0.00	0.00	
Night Setback	0.00	3,896.64	0.00	
Sub Total	0.52	6,829.42	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	3,379.78	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.52</b>	<b>10,209.20</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

## ENERGY CALCULATION PARAMETERS

BLDG: 0003	BUILDING NAME: POST CHAPEL
Building UA: 2,020	CONDITIONED SQFT: 4,340

### SYSTEM INFORMATION

System Type: 16
System Name: Heating and Ventilating Unit
System Number: AHU-2

### TYPICAL BUILDING INFORMATION

Category Number: 9	Construction: SANDSTONE BLOCK	Use: CHURCH	Occupancy HRS: 0700-1800	Occupancy Days: M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

### INPUTS

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	5,000
CFM-CLG:	0
%OA:	15%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

### CONSTANTS

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0003

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,977.48	69.70	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	107.46	
Sub Total	0.00	8,668.71	177.16	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	93.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,668.71</b>	<b>270.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0003

BUILDING NAME: POST CHAPEL

Building UA:	2,020	CONDITIONED SQFT:	4,340
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
9	SANDSTONE BLOCK	CHURCH	0700-1800	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	750,000
BLR CAP OUTPUT (BTUH):	600,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0003

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0003****BUILDING NAME: POST CHAPEL**

Building UA:	2,020	CONDITIONED SQFT:	4,340
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
9	SANDSTONE BLOCK	CHURCH	0700-1800	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0003

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CT-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,661.41	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,030.37	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,030.37</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 6  
POST CHAPEL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0006 BUILDING NAME: POST CHAPEL  
Building UA: 1,426 CONDITIONED SQFT: 6,230

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
9 SANDSTONE BLOCK CHURCH 0700-1800 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ/AMS

BLDG: 0006

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,807.56	112.88	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	3,189.06	26.55	
Sub Total	3.12	14,463.34	139.43	
Economizer	0.00	1,427.46	0.00	
Ventilation/Recirculation	0.00	107.97	6.00	
DDC Control	0.00	2,770.25	23.11	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>18,769.02</b>	<b>168.54</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0006****BUILDING NAME: POST CHAPEL**

Building UA:	1,426	CONDITIONED SQFT:	6,230
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
9	SANDSTONE BLOCK	CHURCH	0700-1800	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760

CLG HRS SAVED:	2,200
HTG HRS SAVED:	3,520
C/H HRS SAVED:	5,736

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DCCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ/AMS

BLDG: 0006

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,807.56	112.88	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	3,189.06	26.55	
<b>Sub Total</b>	<b>3.12</b>	<b>14,463.34</b>	<b>139.43</b>	
Economizer	0.00	1,427.46	0.00	
Ventilation/Recirculation	0.00	107.97	6.00	
DDC Control	0.00	2,770.25	23.11	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>18,769.02</b>	<b>168.54</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0006 BUILDING NAME: POST CHAPEL  
Building UA: 1,426 CONDITIONED SQFT: 6,230

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
9 SANDSTONE BLOCK CHURCH 0700-1800 M-F; SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	0.12
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	900
CFM-CLG:	900
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ/AMS

BLDG: 0006

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	641.83	0.00	
Opt ST/SP	0.00	34.13	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	717.54	7.59	
Sub Total	0.00	1,393.49	7.59	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	623.31	6.60	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,016.80</b>	<b>14.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0006

BUILDING NAME: POST CHAPEL

Building UA:	1,426	CONDITIONED SQFT:	6,230
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	9 SANDSTONE BLOCK	CHURCH	0700-1800	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	0.24
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	750,000
BLR CAP OUTPUT (BTUH):	600,000

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ/AMS

BLDG: 0006

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	787.78	0.00	
Opt ST/SP	0.00	68.26	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	856.04	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.25	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>856.04</b>	<b>4.25</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0006

BUILDING NAME: POST CHAPEL

Building UA:	1,426	CONDITIONED SQFT:	6,230
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
9	SANDSTONE BLOCK	CHURCH	0700-1800	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	9	9	9	9	9	9
REQ STOP:	22	16	16	22	16	16	12

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,160	3,360
HTG HRS ON:	1,856	5,376
H/C HRS ON:	3,024	8,760
CLG HRS SAVED:	2,200	
HTG HRS SAVED:	3,520	
C/H HRS SAVED:	5,736	

**CONSTANTS**

HOAUHC:	16.4
HOAUH:	26.4
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	44.1
HOAOH:	70.9
COAOHC:	0.00145
COAOC:	0.00384
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000312
ECHC:	0.000118
NSUCHC:	0.000139
NSUCC:	0.000369
DDCCHC:	0.000229
DDCCC:	0.000607
NSC:	53200
DDCH:	46300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ/AMS

BLDG: 0006

BUILDING NAME: POST CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CT-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,366.56	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	3,833.29	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.17</b>	<b>3,833.29</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 27**  
**OFFICER QUARTERS MILIT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

Building UA:	6,395	CONDITIONED SQFT:	38,146
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	500,000
BLR CAP OUTPUT (BTUH):	405,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.84	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>2.84</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

Building UA:	6,395	CONDITIONED SQFT:	38,146
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	400,000
BLR CAP OUTPUT (BTUH):	329,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.27	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>2.27</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

Building UA:	6,395	CONDITIONED SQFT:	38,146
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6.SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 0027****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.80</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0027 BUILDING NAME: OFF QTRS MILIT  
Building UA: 6,395 CONDITIONED SQFT: 38,146

**SYSTEM INFORMATION**

System Type: 26  
System Name: Pump  
System Number: CWP-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0027

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.80</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 29**  
**RED CROSS BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

Building UA:	2,004	CONDITIONED SQFT:	3,000
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,250
CFM-CLG:	2,250
%OA:	10%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,899.71	40.12	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	8,788.20	157.51	
Sub Total	0.92	11,825.80	197.63	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,169.86	51.82	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>13,995.66</b>	<b>249.45</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0029****BUILDING NAME: RED CROSS BLDG****Building UA: 2,004****CONDITIONED SQFT: 3,000****SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-2

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	8	8	10	8	8	10
<b>REQ STOP:</b>	0	17	17	17	17	17	12

**INPUTS**

<b>Motor HP:</b>	0.33
<b>HP Effic:</b>	0.65
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,500
<b>CFM-CLG:</b>	1,500
<b>%OA:</b>	10%
<b>%Area:</b>	40%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	900	3,360
<b>HTG HRS ON:</b>	1,440	5,376
<b>H/C HRS ON:</b>	2,346	8,760
<b>CLG HRS SAVED:</b>	2,460	
<b>HTG HRS SAVED:</b>	3,936	
<b>C/H HRS SAVED:</b>	6,414	

**CONSTANTS**

<b>HOAUHC:</b>	27.8
<b>HOAUH:</b>	44.6
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	40.4
<b>HOAOH:</b>	65
<b>COAOHC:</b>	0.000877
<b>COAOC:</b>	0.00232
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.0000629
<b>ECHC:</b>	0.0000238
<b>NSUCHC:</b>	0.000609
<b>NSUCC:</b>	0.00161
<b>DDCCHC:</b>	0.000411
<b>DDCCC:</b>	0.00109
<b>NSC:</b>	131000
<b>DDCH:</b>	43100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,943.25	26.74	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.62	0.00	0.00	
Night Setback	0.00	5,858.80	105.01	
Sub Total	0.62	7,894.46	131.75	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,446.57	34.55	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.62</b>	<b>9,341.04</b>	<b>166.30</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

Building UA:	2,004	CONDITIONED SQFT:	3,000
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	6
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0029****BUILDING NAME: RED CROSS BLDG****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	105.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	5.05	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>5.05</b>	<b>105.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

Building UA:	2,004	CONDITIONED SQFT:	3,000
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0029

BUILDING NAME: RED CROSS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 200  
ADMINISTRATION GENERAL PURPOSE**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN FURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,562,500
BLR CAP OUTPUT (BTUH):	2,050,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4: SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,562,500
BLR CAP OUTPUT (BTUH):	2,050,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CT-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,115.34	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,115.34</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CT-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	263.04	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>263.04</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.50
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	11,270
CFM-CLG:	11,270
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type: 22

System Name: Heat pump unit

System Number: HP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	20,081.39	0.00	
Opt ST/SP	0.00	995.44	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	42,229.70	444.35	
Sub Total	0.00	63,306.54	444.35	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>63,306.54</b>	<b>444.35</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	6,660
CFM-CLG:	6,660
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUHC:	0.000609
NSUC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	24,955.62	222.18	
Sub Total	0.00	34,837.80	222.18	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>34,837.80</b>	<b>222.18</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	5,910
CFM-CLG:	5,910
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	22,145.30	222.18	
Sub Total	0.00	32,027.48	222.18	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>32,027.48</b>	<b>222.18</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.50
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	8,470
CFM-CLG:	8,470
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,343.85	0.00	
Opt ST/SP	0.00	711.03	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	31,737.85	222.18	
Sub Total	0.00	46,792.73	222.18	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>46,792.73</b>	<b>222.18</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0200****BUILDING NAME: ADMIN GEN PURP**

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	7,480
CFM-CLG:	7,480
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0200****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-5

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	28,028.23	222.18	
Sub Total	0.00	37,910.41	222.18	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>37,910.41</b>	<b>222.18</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200 BUILDING NAME: ADMIN GEN PURP  
Building UA: 16,960 CONDITIONED SQFT: 60,690

**SYSTEM INFORMATION**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-6

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
4 SANDSTONE BLOCK ADMINISTRATION 0700-1700 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	4.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	8,000
%OA:	13%
%Area:	27%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	22,950.16	177.89	
Opt ST/SP	0.00	1,137.65	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	29,976.72	599.88	
Sub Total	0.00	54,064.53	777.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>54,064.53</b>	<b>777.77</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0200****BUILDING NAME: ADMIN GEN PURP**

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	50.00
HP Effic:	0.92
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	9,946.67	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,946.67	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,946.67</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0200

BUILDING NAME: ADMIN GEN PURP

Building UA:	16,960	CONDITIONED SQFT:	60,690
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	50.00
HP Effic:	0.92
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0200****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	9,946.67	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,946.67	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,946.67</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**BUILDING 202**  
**PHYSICAL FITNESS CENTER**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR**

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,500
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,958.73	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	2,425.46	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.17</b>	<b>2,425.46</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR**

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	18,500
CFM-CLG:	18,500
%OA:	10%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,518.47	129.03	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	39,326.56	283.65	
<b>Sub Total</b>	<b>7.46</b>	<b>53,960.38</b>	<b>412.68</b>	
Economizer	0.00	832.68	0.00	
Ventilation/Recirculation	0.00	120.19	11.79	
DDC Control	0.00	1,434.62	7.34	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>56,347.86</b>	<b>431.81</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
26	Direct digital control - Large SZ AHU	0	2	0	4	\$1,281.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>\$2,412.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR**

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	5,313,000
BLR CAP OUTPUT (BTUH):	4,250,000

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

## ENERGY CALCULATION PARAMETERS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

Building UA:	6,674	CONDITIONED SQFT:	51,307
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### SYSTEM INFORMATION

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

### INPUTS

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	45
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

### CONSTANTS

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	787.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	37.87	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>37.87</b>	<b>787.50</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0202 BUILDING NAME: PHYS FITNESS CTR  
Building UA: 6,674 CONDITIONED SQFT: 51,307

**SYSTEM INFORMATION**

System Type: 26  
System Name: Pump  
System Number: CT-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUHC:	0.000637
NSUC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CT-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,263.19	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,470.04	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,470.04</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,477.53	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	453.83	
Sub Total	0.00	2,846.49	453.83	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	11.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,846.49</b>	<b>465.58</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,477.53	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	453.83	
Sub Total	0.00	2,846.49	453.83	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	11.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,846.49</b>	<b>465.58</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR**

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	5,750
CFM-CLG:	0
%OA:	0%
%Area:	11%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,133.97	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	312.01	
Sub Total	0.00	3,600.69	312.01	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	8.08	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,600.69</b>	<b>320.09</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0202****BUILDING NAME: PHYS FITNESS CTR**

Building UA: 6,674

CONDITIONED SQFT: 51,307

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	8,000
%OA:	0%
%Area:	21%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,477.53	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	595.65	
Sub Total	0.00	2,846.49	595.65	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	15.42	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,846.49</b>	<b>611.07</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM.AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

Building UA:	6,674	CONDITIONED SQFT:	51,307
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	UH-5

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	21	22	22	22	22	22	21

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,080	3,360
HTG HRS ON:	3,328	5,376
H/C HRS ON:	5,423	8,760
CLG HRS SAVED:	1,280	
HTG HRS SAVED:	2,048	
C/H HRS SAVED:	3,337	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM.AJN/AMS

BLDG: 0202

BUILDING NAME: PHYS FITNESS CTR

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: UH-5

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,477.53	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	453.83	
<b>Sub Total</b>	<b>0.00</b>	<b>2,846.49</b>	<b>453.83</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	11.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,846.49</b>	<b>465.58</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 203  
CALVARY MUSEUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,265	CONDITIONED SQFT:	5,800
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	5,200
CFM-CLG:	5,200
%OA:	20%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	23,453.55	185.43	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	20,310.50	296.72	
Sub Total	0.00	44,879.39	482.14	
Economizer	0.00	290.39	0.00	
Ventilation/Recirculation	0.00	0.00	8.82	
DDC Control	0.00	5,014.79	97.62	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>50,184.57</b>	<b>588.58</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

Building UA: 2,265

CONDITIONED SQFT: 5,800

**SYSTEM INFORMATION**

System Type: 7

System Name: Large air cooled chiller

System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.72
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	60
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,159.98	0.00	
Opt ST/SP	0.00	763.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.92	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.92	6,923.71	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,050.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	50.49	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>52.41</b>	<b>7,973.71</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

Building UA: 2,265

CONDITIONED SQFT: 5,800

**SYSTEM INFORMATION**

System Type: 26

System Name: Pump

System Number: CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0203

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,575.17	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	6,266.40	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.73</b>	<b>6,266.40</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 205  
CALVARY MUSEUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0205 BUILDING NAME: CAVALRY MUSEUM  
Building UA: 5,291 CONDITIONED SQFT: 16,496

**SYSTEM INFORMATION**

System Type: 14  
System Name: Large Single Zone air handling unit with Humidification  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	17	17	17	17	17	17	17

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	11,400
CFM-CLG:	11,400
%OA:	15%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY: JMAJN/AMS

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type: 14  
 System Name: Large Single Zone air handling unit with Humidification  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	21,928.12	285.06	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	41,630.80	450.53	
Sub Total	0.00	64,674.26	735.59	
Economizer	0.00	749.81	0.00	
Ventilation/Recirculation	0.00	0.00	14.50	
DDC Control	0.00	12,948.44	148.23	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>78,372.51</b>	<b>898.31</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0205****BUILDING NAME: CAVALRY MUSEUM**

Building UA:	5,291	CONDITIONED SQFT:	16,496
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	17	17	17	17	17	17	17

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	6,200
CFM-CLG:	6,200
%OA:	0%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY: JMAJN/AMS

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,589.88	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	22,641.31	242.59	
Sub Total	0.00	36,922.43	242.59	
Economizer	0.00	407.79	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,042.13	79.81	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>44,372.35</b>	<b>322.41</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

Building UA:	5,291	CONDITIONED SQFT:	16,496
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	17	17	17	17	17	17	17

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,410.78	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	9,526.13	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.80</b>	<b>9,526.13</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

Building UA:	5,291	CONDITIONED SQFT:	16,496
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	17	17	17	17	17	17	17

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 0205

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,340.09	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,031.32	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,031.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 206**  
**THEATER W/O DRESSING ROOM**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0206

BUILDING NAME: ADMIN GEN PURP

Building UA:	3,088	CONDITIONED SQFT:	10,754
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**SYSTEM INFORMATION**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
20	BRICK AND CMU	THEATER	1700-2400	TH-F,SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	13,500
CFM-CLG:	13,500
%OA:	15%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	26.6
HOAUH:	42.7
COAUHC:	0.000589
COAUC:	0.00156
HOAOHC:	29.2
HOAOH:	46.9
COAOHC:	0.00251
COAOC:	0.00664
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000496
ECHC:	0.000188
NSUCHC:	0.000476
NSUCC:	0.00126
DDCCHC:	0.000699
DDCCC:	0.00185
NSC:	202000
DDCH:	116000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0206

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	28,574.46	317.38	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	37,862.91	623.78	
Sub Total	7.46	67,552.72	941.16	
Economizer	0.00	7,278.62	0.00	
Ventilation/Recirculation	0.00	363.78	16.43	
DDC Control	0.00	27,062.53	358.21	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>102,257.65</b>	<b>1,315.79</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
26	Direct digital control - Large SZ AHU	0	2	0	4	\$1,281.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>\$2,412.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0206

BUILDING NAME: ADMIN GEN PURP

Building UA: 3,088

CONDITIONED SQFT: 10,754

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
20	BRICK AND CMU	THEATER	1700-2400	TH-F,SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	982,500
BLR CAP OUTPUT (BTUH):	786,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	26.6
HOAUH:	42.7
COAUHC:	0.000589
COAUC:	0.00156
HOAOHC:	29.2
HOAOH:	46.9
COAOHC:	0.00251
COAOC:	0.00664
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000496
ECHC:	0.000188
NSUCHC:	0.000476
NSUCC:	0.00126
DDCCHC:	0.000699
DDCCC:	0.00185
NSC:	202000
DDCH:	116000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

**BLDG: 0206****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0206

BUILDING NAME: ADMIN GEN PURP

Building UA:	3,088	CONDITIONED SQFT:	10,754
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	20 BRICK AND CMU	THEATER	1700-2400	TH-F,SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	50
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	26.6
HOAUH:	42.7
COAUHC:	0.000589
COAUC:	0.00156
HOAOHC:	29.2
HOAOH:	46.9
COAOHC:	0.00251
COAOC:	0.00664
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000496
ECHC:	0.000188
NSUCHC:	0.000476
NSUCC:	0.00126
DDCCHC:	0.000699
DDCCC:	0.00185
NSC:	202000
DDCH:	116000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0206

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	875.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	42.08	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>42.08</b>	<b>875.00</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**BUILDING 207  
CALVARY MUSEUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	650
CFM-CLG:	650
%OA:	10%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type: 14  
 System Name: Large Single Zone air handling unit with Humidification  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,801.06	12.15	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,662.66	59.13	
Sub Total	0.00	8,726.76	71.28	
Economizer	0.00	31.46	0.00	
Ventilation/Recirculation	0.00	0.00	0.55	
DDC Control	0.00	543.27	19.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,301.48</b>	<b>91.29</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207 BUILDING NAME: CAVALRY MUSEUM  
Building UA: 2,655 CONDITIONED SQFT: 8,278

**SYSTEM INFORMATION**

System Type: 14  
System Name: Large Single Zone air handling unit with Humidification  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
4 SANDSTONE BLOCK ADMINISTRATION 0700-1700 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,515
CFM-CLG:	1,515
%OA:	10%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,801.06	28.33	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	6,206.04	59.13	
Sub Total	0.00	12,270.14	87.46	
Economizer	0.00	73.32	0.00	
Ventilation/Recirculation	0.00	0.00	1.28	
DDC Control	0.00	1,266.23	19.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,609.70</b>	<b>108.19</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207	BUILDING NAME: CAVALRY MUSEUM
Building UA: 2,655	CONDITIONED SQFT: 8,278

**SYSTEM INFORMATION**

System Type: 14
System Name: Large Single Zone air handling unit with Humidification
System Number: AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,050
CFM-CLG:	2,050
%OA:	10%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type: 14  
 System Name: Large Single Zone air handling unit with Humidification  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,137.16	38.33	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	8,397.61	59.13	
Sub Total	0.00	16,903.74	97.46	
Economizer	0.00	99.22	0.00	
Ventilation/Recirculation	0.00	0.00	1.74	
DDC Control	0.00	1,713.39	19.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>18,716.34</b>	<b>118.65</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	1,950
CFM-CLG:	1,950
%OA:	10%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type: 14  
 System Name: Large Single Zone air handling unit with Humidification  
 System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,137.16	36.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	7,987.97	55.65	
Sub Total	0.00	16,494.10	92.11	
Economizer	0.00	94.38	0.00	
Ventilation/Recirculation	0.00	0.00	1.65	
DDC Control	0.00	1,629.81	18.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>18,218.28</b>	<b>112.08</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,180
CFM-CLG:	2,180
%OA:	10%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-5

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,137.16	40.76	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	8,930.14	59.13	
Sub Total	0.00	17,436.27	99.89	
Economizer	0.00	105.51	0.00	
Ventilation/Recirculation	0.00	0.00	1.85	
DDC Control	0.00	1,822.04	19.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>19,363.82</b>	<b>121.19</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,145
CFM-CLG:	2,145
%OA:	10%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	14
System Name:	Large Single Zone air handling unit with Humidification
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,137.16	40.11	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	8,786.77	55.65	
Sub Total	0.00	17,292.90	95.76	
Economizer	0.00	103.82	0.00	
Ventilation/Recirculation	0.00	0.00	1.82	
DDC Control	0.00	1,792.79	18.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>19,189.50</b>	<b>115.89</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
31	Direct digital control - AHU w/ Space Humidity Control	0	3	0	5	\$1,849.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>\$2,980.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	63%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	525,000
BLR CAP OUTPUT (BTUH):	420,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

### ENERGY CALCULATION SUMMARY

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,355.63	0.00	
Opt ST/SP	0.00	395.70	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,751.34	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.98	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,751.34</b>	<b>2.98</b>	<b>4.00</b>

### TYPICAL SYSTEM POINT AND COST SUMMARY

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,337.31	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.29	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.29	4,850.05	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>26.53</b>	<b>5,375.05</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA:	2,655	CONDITIONED SQFT:	8,278
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,948.06	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	4,414.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.17</b>	<b>4,414.79</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

Building UA: 2,655

CONDITIONED SQFT: 8,278

**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	10	10	10	10	10	10
REQ STOP:	16	16	16	16	16	16	16

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	780	3,360
HTG HRS ON:	1,248	5,376
H/C HRS ON:	2,034	8,760
CLG HRS SAVED:	2,580	
HTG HRS SAVED:	4,128	
C/H HRS SAVED:	6,726	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0207

BUILDING NAME: CAVALRY MUSEUM

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,993.76	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,362.73	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,362.73</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 210**  
**MILIT PERSONNEL BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0210****BUILDING NAME: MILIT PERS BLDG**

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	48,000
CFM-CLG:	48,000
%OA:	10%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	42,797.50	821.04	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	179,860.32	334.71	
<b>Sub Total</b>	<b>14.19</b>	<b>224,779.31</b>	<b>1,155.74</b>	
Economizer	0.00	2,978.40	0.00	
Ventilation/Recirculation	0.00	0.00	40.70	
DDC Control	0.00	51,433.71	110.12	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>14.19</b>	<b>279,191.42</b>	<b>1,306.56</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0210****BUILDING NAME: MILIT PERS BLDG**

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	38,400
CFM-CLG:	38,400
%OA:	10%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	42,797.50	656.83	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	143,888.26	267.76	
<b>Sub Total</b>	<b>14.19</b>	<b>188,807.24</b>	<b>924.59</b>	
Economizer	0.00	2,382.72	0.00	
Ventilation/Recirculation	0.00	0.00	32.56	
DDC Control	0.00	41,146.97	88.10	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>14.19</b>	<b>232,336.94</b>	<b>1,045.25</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	27,000
CFM-CLG:	27,000
%OA:	10%
%Area:	30%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	13
System Name:	Large Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	33,141.02	461.83	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	101,171.43	401.65	
Sub Total	10.99	135,955.27	863.48	
Economizer	0.00	1,675.35	0.00	
Ventilation/Recirculation	0.00	0.00	22.89	
DDC Control	0.00	28,931.46	132.14	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>166,562.08</b>	<b>1,018.52</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
26	Direct digital control - Large SZ AHU	0	2	0	4	\$1,281.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>\$2,412.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0210****BUILDING NAME: MILIT PERS BLDG**

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	10%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	68.42	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	14,988.36	107.11	
<b>Sub Total</b>	<b>3.12</b>	<b>24,870.54</b>	<b>175.53</b>	
Economizer	0.00	248.20	0.00	
Ventilation/Recirculation	0.00	0.00	3.39	
DDC Control	0.00	4,286.14	35.24	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>29,404.88</b>	<b>214.16</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	5,100
CFM-CLG:	5,100
%OA:	10%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,944.40	87.24	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	19,110.16	66.94	
Sub Total	4.62	33,745.79	154.18	
Economizer	0.00	316.45	0.00	
Ventilation/Recirculation	0.00	0.00	4.32	
DDC Control	0.00	5,464.83	22.02	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>39,527.08</b>	<b>180.52</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-6

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	12,000
CFM-CLG:	12,000
%OA:	10%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-6

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	22,500.15	205.26	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	44,965.08	160.66	
<b>Sub Total</b>	<b>7.46</b>	<b>68,580.58</b>	<b>365.92</b>	
Economizer	0.00	744.60	0.00	
Ventilation/Recirculation	0.00	0.00	10.17	
DDC Control	0.00	12,858.43	52.86	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>82,183.61</b>	<b>428.95</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.41
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,392,000
BLR CAP OUTPUT (BTUH):	2,033,200

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	27,616.29	0.00	
Opt ST/SP	0.00	2,230.66	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	29,846.95	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	13.56	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>29,846.95</b>	<b>13.56</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0210****BUILDING NAME: MILIT PERS BLDG**

Building UA:	10,220	CONDITIONED SQFT:	58,448
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	130
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0210

BUILDING NAME: MILIT PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	16,415.48	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	5.32	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	5.32	18,536.97	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	2,275.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	109.40	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>114.72</b>	<b>20,811.97</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**BUILDING 211  
ADMINISTRATION**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS****BLDG: 0211****BUILDING NAME: ADMIN**

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	52.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.52	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.52</b>	<b>52.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	14,400
%OA:	30%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,061.26	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	94.06	
<b>Sub Total</b>	<b>0.00</b>	<b>4,752.49</b>	<b>94.06</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	30.95	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,752.49</b>	<b>125.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	2,250
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	965.92	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	4,057.20	0.00	
Sub Total	0.66	5,286.16	0.00	
Economizer	0.00	317.02	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	5,493.60	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.66</b>	<b>11,096.78</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,775,000
BLR CAP OUTPUT (BTUH):	1,420,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,775,000
BLR CAP OUTPUT (BTUH):	1,420,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4:SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	45%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**BLDG: 0211****BUILDING NAME: ADMIN****ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0211

BUILDING NAME: ADMIN

Building UA:	7,180	CONDITIONED SQFT:	41,062
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	7	7	7	7	7	7	7
REQ STOP:	23	23	23	23	23	23	23

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	45%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,240	3,360
HTG HRS ON:	3,584	5,376
H/C HRS ON:	5,840	8,760
CLG HRS SAVED:	1,120	
HTG HRS SAVED:	1,792	
C/H HRS SAVED:	2,920	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0211

BUILDING NAME: ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 214**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,120
CFM-CLG:	10,120
%OA:	15%
%Area:	31%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	35.18	
Sub Total	7.46	0.00	35.18	
Economizer	0.00	8,953.77	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,934.28	69.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>16,888.05</b>	<b>105.18</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,039
CFM-CLG:	10,039
%OA:	15%
%Area:	31%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	35.18	
<b>Sub Total</b>	<b>7.46</b>	<b>0.00</b>	<b>35.18</b>	
Economizer	0.00	8,882.11	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,870.78	69.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>16,752.88</b>	<b>105.18</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,100
CFM-CLG:	1,100
%OA:	10%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	4.54	
Sub Total	1.76	0.00	4.54	
Economizer	0.00	973.24	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	862.42	9.03	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>1,835.66</b>	<b>13.57</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214 BUILDING NAME: ENL BARRACKS W/AS  
 Building UA: 6,005 CONDITIONED SQFT: 35,821

**SYSTEM INFORMATION**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	2,400
%OA:	10%
%Area:	9%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	10.21	
Sub Total	1.76	0.00	10.21	
Economizer	0.00	2,123.42	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,881.65	20.32	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>4,005.07</b>	<b>30.54</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	2,800
%OA:	15%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	11.35	
Sub Total	1.76	0.00	11.35	
Economizer	0.00	2,477.33	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,195.26	22.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>4,672.58</b>	<b>33.93</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 6,005 CONDITIONED SQFT: 35,821

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	948,000
BLR CAP OUTPUT (BTUH):	758,400

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA: 6,005

CONDITIONED SQFT: 35,821

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	948,000
BLR CAP OUTPUT (BTUH):	758,400

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0214****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>60.64</b>	<b>1,225.00</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	6,005	CONDITIONED SQFT:	35,821
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0214

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 222**  
**ADMINISTRATION GENERAL PURPOSE**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

Building UA:	3,297	CONDITIONED SQFT:	18,854
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	7	7	7	7	7	10
REQ STOP:	17	17	20	20	20	20	19

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	9,800
CFM-CLG:	9,800
%OA:	10%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,540	3,360
HTG HRS ON:	2,464	5,376
H/C HRS ON:	4,015	8,760
CLG HRS SAVED:	1,820	
HTG HRS SAVED:	2,912	
C/H HRS SAVED:	4,745	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	17,351.81	129.27	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	28,319.11	259.14	
Sub Total	7.46	46,786.27	388.42	
Economizer	0.00	936.46	0.00	
Ventilation/Recirculation	0.00	0.00	8.31	
DDC Control	0.00	16,171.62	85.26	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>63,894.34</b>	<b>481.99</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0222	BUILDING NAME: ADMIN GEN PURP
Building UA: 3,297	CONDITIONED SQFT: 18,854

**SYSTEM INFORMATION**

System Type: 1
System Name: Small hot water boiler
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	7	7	7	7	7	10
REQ STOP:	17	17	20	20	20	20	19

**INPUTS**

Motor HP:	0.29
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	434,000
BLR CAP OUTPUT (BTUH):	350,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUH:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,540	3,360
HTG HRS ON:	2,464	5,376
H/C HRS ON:	4,015	8,760
CLG HRS SAVED:	1,820	
HTG HRS SAVED:	2,912	
C/H HRS SAVED:	4,745	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	787.48	0.00	
Opt ST/SP	0.00	82.48	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	869.96	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.46	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>869.96</b>	<b>2.46</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS****BLDG: 0222****BUILDING NAME: ADMIN GEN PURP**

<b>Building UA:</b>	<b>3,297</b>	<b>CONDITIONED SQFT:</b>	<b>18,854</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>6</b>
<b>System Name:</b>	<b>Small air cooled chiller</b>
<b>System Number:</b>	<b>CH-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>4</b>	<b>SANDSTONE BLOCK</b>	<b>ADMINISTRATION</b>	<b>0700-1700</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>11</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>10</b>
<b>REQ STOP:</b>	<b>17</b>	<b>17</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>19</b>

**INPUTS**

<b>Motor HP:</b>	<b>3.00</b>
<b>HP Effic:</b>	<b>0.79</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>30</b>
<b>KW-TON:</b>	<b>1.10</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,540</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>2,464</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>4,015</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>1,820</b>	
<b>HTG HRS SAVED:</b>	<b>2,912</b>	
<b>C/H HRS SAVED:</b>	<b>4,745</b>	

**CONSTANTS**

<b>HOAUHC:</b>	<b>27.8</b>
<b>HOAUH:</b>	<b>44.6</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>40.4</b>
<b>HOAOH:</b>	<b>65</b>
<b>COAOHC:</b>	<b>0.000877</b>
<b>COAOC:</b>	<b>0.00232</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.0000629</b>
<b>ECHC:</b>	<b>0.0000238</b>
<b>NSUCHC:</b>	<b>0.000609</b>
<b>NSUCC:</b>	<b>0.00161</b>
<b>DDCCHC:</b>	<b>0.000411</b>
<b>DDCCC:</b>	<b>0.00109</b>
<b>NSC:</b>	<b>131000</b>
<b>DDCH:</b>	<b>43100</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,124.72	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	4,815.95	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>26.98</b>	<b>5,340.95</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

Building UA: 3,297

CONDITIONED SQFT: 18,854

**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	7	7	7	7	7	10
REQ STOP:	17	17	20	20	20	20	19

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,540	3,360
HTG HRS ON:	2,464	5,376
H/C HRS ON:	4,015	8,760
CLG HRS SAVED:	1,820	
HTG HRS SAVED:	2,912	
C/H HRS SAVED:	4,745	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DCCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0222

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	217.24	0.00	
Opt ST/SP	0.00	22.75	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	239.99	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>239.99</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 223**  
**ENLISTED BARRACKS W/DAS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0223****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA: 7,623

CONDITIONED SQFT: 47,794

**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	7,450
CFM-CLG:	7,450
%OA:	15%
%Area:	28%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	40.34	
Sub Total	10.99	0.00	40.34	
Economizer	0.00	6,591.46	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	5,840.95	80.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>12,432.41</b>	<b>120.60</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0223****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	7,150
CFM-CLG:	7,150
%OA:	15%
%Area:	27%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	38.90	
Sub Total	10.99	0.00	38.90	
Economizer	0.00	6,326.03	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	5,605.74	77.39	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>11,931.78</b>	<b>116.29</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0223****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	5,000
CFM-CLG:	5,000
%OA:	20%
%Area:	14%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	20.17	
Sub Total	7.46	0.00	20.17	
Economizer	0.00	4,423.80	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	3,920.10	40.13	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>8,343.90</b>	<b>60.30</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0223****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	15%
%Area:	11%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	15.85	
Sub Total	7.46	0.00	15.85	
Economizer	0.00	3,539.04	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	3,136.08	31.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>6,675.12</b>	<b>47.38</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0223 BUILDING NAME: ENL BARRACKS W/DAS  
Building UA: 7,623 CONDITIONED SQFT: 47,794

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,232,000
BLR CAP OUTPUT (BTUH):	1,860,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0223****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>59.56</b>	<b>1,225.00</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	4,200
CFM-CLG:	0
%OA:	0%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	8.64	
Sub Total	0.00	0.00	8.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>8.64</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

Building UA:	7,623	CONDITIONED SQFT:	47,794
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.50
HP Effc:	0.66
Load Factor:	0.80
CFM-HTG:	4,800
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0223

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	11.53	
Sub Total	0.00	0.00	11.53	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>11.53</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 227**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,120
CFM-CLG:	10,120
%OA:	10%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	38.95	
Sub Total	7.46	0.00	38.95	
Economizer	0.00	8,953.77	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,934.28	77.49	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>16,888.05</b>	<b>116.44</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,039
CFM-CLG:	10,039
%OA:	10%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	38.95	
Sub Total	7.46	0.00	38.95	
Economizer	0.00	8,882.11	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,870.78	77.49	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>16,752.88</b>	<b>116.44</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,100
CFM-CLG:	1,100
%OA:	10%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	3.89	
Sub Total	1.76	0.00	3.89	
Economizer	0.00	973.24	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	862.42	7.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>1,835.66</b>	<b>11.64</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,100
CFM-CLG:	1,100
%OA:	10%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	3.89	
Sub Total	1.76	0.00	3.89	
Economizer	0.00	973.24	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	862.42	7.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>1,835.66</b>	<b>11.64</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0227****BUILDING NAME: ENL BARRACKS W/AS****Building UA:** 5,152**CONDITIONED SQFT:** 32,303**SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-5

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	1.00
<b>HP Effic:</b>	0.69
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	2,800
<b>CFM-CLG:</b>	2,800
<b>%OA:</b>	10%
<b>%Area:</b>	12%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	8.06
<b>HOAOH:</b>	13
<b>COAOHC:</b>	0.000274
<b>COAOC:</b>	0.000725
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000267
<b>ECHC:</b>	0.000101
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000895
<b>DDCCC:</b>	0.000237
<b>NSC:</b>	18900
<b>DDCH:</b>	37600
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	11.68	
Sub Total	1.76	0.00	11.68	
Economizer	0.00	2,477.33	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,195.26	23.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>4,672.58</b>	<b>34.93</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA: 5,152

CONDITIONED SQFT: 32,303

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	948,000
BLR CAP OUTPUT (BTUH):	758,400

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	948,000
BLR CAP OUTPUT (BTUH):	758,400

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,152	CONDITIONED SQFT:	32,303
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	65
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0227

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,137.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	54.70	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>56.43</b>	<b>1,137.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**BUILDING 253  
DRUG ABUSE CENTER**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10 BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,350
CFM-CLG:	1,350
%OA:	15%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUHC:	0.000143
NSUC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,921.05	65.20	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.38	0.00	0.00	
Night Setback	0.00	1,238.14	8.69	
Sub Total	1.38	7,366.04	73.89	
Economizer	0.00	988.32	0.00	
Ventilation/Recirculation	0.00	74.73	3.10	
DDC Control	0.00	376.95	9.73	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.38</b>	<b>8,806.04</b>	<b>86.72</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0253****BUILDING NAME: DRUG ABUSE CTR**

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,060
CFM-CLG:	3,060
%OA:	15%
%Area:	21%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,320.72	147.78	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	2,806.45	18.25	
Sub Total	2.47	14,496.14	166.03	
Economizer	0.00	2,240.18	0.00	
Ventilation/Recirculation	0.00	169.39	7.03	
DDC Control	0.00	854.43	20.43	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>17,760.14</b>	<b>193.49</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,505
CFM-CLG:	2,505
%OA:	15%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,447.22	120.98	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	2,297.44	13.90	
Sub Total	1.76	11,007.70	134.88	
Economizer	0.00	1,833.87	0.00	
Ventilation/Recirculation	0.00	138.67	5.75	
DDC Control	0.00	699.46	15.57	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>13,679.70</b>	<b>156.20</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253 BUILDING NAME: DRUG ABUSE CTR  
Building UA: 2,414 CONDITIONED SQFT: 11,122

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,920
CFM-CLG:	1,920
%OA:	15%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,766.24	92.72	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	1,760.91	11.30	
<b>Sub Total</b>	<b>1.76</b>	<b>9,790.19</b>	<b>104.02</b>	
Economizer	0.00	1,405.60	0.00	
Ventilation/Recirculation	0.00	106.29	4.41	
DDC Control	0.00	536.11	12.65	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>11,838.20</b>	<b>121.08</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253 BUILDING NAME: DRUG ABUSE CTR  
Building UA: 2,414 CONDITIONED SQFT: 11,122

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10 BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,630
CFM-CLG:	2,630
%OA:	15%
%Area:	9%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,820.17	127.01	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	2,412.08	7.82	
Sub Total	2.47	13,601.22	134.84	
Economizer	0.00	1,925.39	0.00	
Ventilation/Recirculation	0.00	145.59	6.04	
DDC Control	0.00	734.36	8.76	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>16,406.56</b>	<b>149.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253 BUILDING NAME: DRUG ABUSE CTR  
Building UA: 2,414 CONDITIONED SQFT: 11,122

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
10 BRICK AND CMU DENTAL CLINIC 0800-1700 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,705
CFM-CLG:	1,705
%OA:	15%
%Area:	21%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,334.30	82.34	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.38	0.00	0.00	
Night Setback	0.00	1,563.72	18.25	
Sub Total	1.38	8,104.87	100.59	
Economizer	0.00	1,248.21	0.00	
Ventilation/Recirculation	0.00	94.38	3.92	
DDC Control	0.00	476.08	20.43	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.38</b>	<b>9,923.53</b>	<b>124.94</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-7

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,945
CFM-CLG:	2,945
%OA:	15%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-7

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,186.85	142.23	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	2,700.98	8.69	
Sub Total	2.47	14,256.80	150.92	
Economizer	0.00	2,155.99	0.00	
Ventilation/Recirculation	0.00	163.03	6.76	
DDC Control	0.00	822.32	9.73	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>17,398.14</b>	<b>167.41</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0253****BUILDING NAME: DRUG ABUSE CTR**

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	963,000
BLR CAP OUTPUT (BTUH):	770,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,669.32	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,876.17	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.46	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,876.17</b>	<b>5.46</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253 BUILDING NAME: DRUG ABUSE CTR  
Building UA: 2,414 CONDITIONED SQFT: 11,122

**SYSTEM INFORMATION**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
10 BRICK AND CMU DENTAL CLINIC 0800-1700 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	32
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,668.33	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.52	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.52	1,875.17	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	560.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	26.93	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>27.45</b>	<b>2,435.17</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253 BUILDING NAME: DRUG ABUSE CTR  
Building UA: 2,414 CONDITIONED SQFT: 11,122

**SYSTEM INFORMATION**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.47	8,127.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>8,127.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

Building UA:	2,414	CONDITIONED SQFT:	11,122
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0253

BUILDING NAME: DRUG ABUSE CTR

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.47	8,127.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>8,127.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 301**  
**FINANCE ADMINISTRATION**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	2,000
%OA:	15%
%Area:	3%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,254.06	50.01	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	7,303.65	28.11	
Sub Total	2.47	14,926.68	78.12	
Economizer	0.00	131.55	0.00	
Ventilation/Recirculation	0.00	0.00	2.54	
DDC Control	0.00	2,271.66	9.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>2.47</b>	<b>17,329.88</b>	<b>89.91</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	10,500
CFM-CLG:	10,500
%OA:	15%
%Area:	14%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	32,298.45	262.55	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	38,344.16	131.17	
<b>Sub Total</b>	<b>10.99</b>	<b>72,285.43</b>	<b>393.72</b>	
Economizer	0.00	690.62	0.00	
Ventilation/Recirculation	0.00	0.00	13.35	
DDC Control	0.00	11,926.19	43.16	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>84,902.24</b>	<b>450.23</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	12,890
CFM-CLG:	12,890
%OA:	15%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	61,914.68	322.32	
Opt ST/SP	0.00	3,149.20	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	21.06	0.00	0.00	
Night Setback	0.00	47,072.02	168.64	
Sub Total	21.06	112,135.91	490.96	
Economizer	0.00	847.81	0.00	
Ventilation/Recirculation	0.00	0.00	16.39	
DDC Control	0.00	14,640.82	55.49	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>21.06</b>	<b>127,624.54</b>	<b>562.84</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,226,000
BLR CAP OUTPUT (BTUH):	919,700

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 0301****BUILDING NAME: FINANCE ADMIN****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.04</b>	<b>437.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA: 7,152

CONDITIONED SQFT: 32,947

**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>25.25</b>	<b>525.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 0301****BUILDING NAME: FINANCE ADMIN****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	175.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	8.42	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>8.42</b>	<b>175.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0301****BUILDING NAME: FINANCE ADMIN**

<b>Building UA:</b>	<b>7,152</b>	<b>CONDITIONED SQFT:</b>	<b>32,947</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>5</b>
<b>System Name:</b>	<b>Steam to hot water converter</b>
<b>System Number:</b>	<b>CV-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>4</b>	<b>SANDSTONE BLOCK</b>	<b>ADMINISTRATION</b>	<b>0700-1700</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>8</b>
<b>REQ STOP:</b>	<b>12</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>12</b>

**INPUTS**

<b>Motor HP:</b>	<b>2.00</b>
<b>HP Effic:</b>	<b>0.78</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>919,700</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>919,700</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>27.8</b>
<b>HOAUH:</b>	<b>44.6</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>40.4</b>
<b>HOAOH:</b>	<b>65</b>
<b>COAOHC:</b>	<b>0.000877</b>
<b>COAOC:</b>	<b>0.00232</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.0000629</b>
<b>ECHC:</b>	<b>0.0000238</b>
<b>NSUCHC:</b>	<b>0.000609</b>
<b>NSUCC:</b>	<b>0.00161</b>
<b>DDCCHC:</b>	<b>0.000411</b>
<b>DDCCC:</b>	<b>0.00109</b>
<b>NSC:</b>	<b>131000</b>
<b>DDCH:</b>	<b>43100</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,060</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,696</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,764</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,300</b>	
<b>HTG HRS SAVED:</b>	<b>3,680</b>	
<b>C/H HRS SAVED:</b>	<b>5,996</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,631.34	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,098.07	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.21	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,098.07</b>	<b>5.21</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvrtr; Optimum start/stop control - STM-HW Cnvrtr; Night setback - STM-HW Cnvrtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

## ENERGY CALCULATION PARAMETERS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

Building UA:	7,152	CONDITIONED SQFT:	32,947
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### SYSTEM INFORMATION

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	8	7	7	7	7	7	8
REQ STOP:	12	16	16	16	16	16	12

### INPUTS

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

### CONSTANTS

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 0301

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,631.34	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,098.07	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,098.07</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 302**  
**FINANCE ADMINISTRATION**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

Building UA: 3,503

CONDITIONED SQFT: 16,138

**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	52.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.52	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.52</b>	<b>52.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/DEJ

## ENERGY CALCULATION PARAMETERS

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

Building UA:	3,503	CONDITIONED SQFT:	16,138
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### SYSTEM INFORMATION

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

### TYPICAL BUILDING INFORMATION

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

### INPUTS

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	12,000
CFM-CLG:	12,000
%OA:	10%
%Area:	83%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### CONSTANTS

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	63,529.85	205.26	
Opt ST/SP	0.00	3,149.20	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	21.06	0.00	0.00	
Night Setback	0.00	44,965.08	380.88	
Sub Total	21.06	111,644.13	586.14	
Economizer	0.00	744.60	0.00	
Ventilation/Recirculation	0.00	0.00	10.17	
DDC Control	0.00	12,858.43	125.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>21.06</b>	<b>125,247.16</b>	<b>721.63</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS****BLDG: 0302****BUILDING NAME: FINANCE ADMIN**

Building UA:	3,503	CONDITIONED SQFT:	16,138
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	450
CFM-CLG:	450
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DCCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	715.06	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.23	0.00	0.00	
Night Setback	0.00	1,709.82	0.00	
Sub Total	0.23	2,517.29	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	490.50	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.23</b>	<b>3,007.79</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS****BLDG: 0302****BUILDING NAME: FINANCE ADMIN**

Building UA:	3,503	CONDITIONED SQFT:	16,138
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.37
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	750,000
BLR CAP OUTPUT (BTUH):	600,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,135.76	0.00	
Opt ST/SP	0.00	737.93	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,873.68	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.25	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,873.68</b>	<b>4.25</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS****BLDG: 0302****BUILDING NAME: FINANCE ADMIN**

Building UA:	3,503	CONDITIONED SQFT:	16,138
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.04</b>	<b>437.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0302 BUILDING NAME: FINANCE ADMIN  
 Building UA: 3,503 CONDITIONED SQFT: 16,138

**SYSTEM INFORMATION**

System Type: 21  
 System Name: HW Unit heater  
 System Number: UH-14

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,520
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DEJ

BLDG: 0302

BUILDING NAME: FINANCE ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1-4

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,144.09	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	68.83	
Sub Total	0.00	1,236.51	68.83	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,236.51</b>	<b>68.83</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 313**  
**CIVILIAN PERSONNEL BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0313

BUILDING NAME: CIV PERS BLDG

Building UA: 1,941

CONDITIONED SQFT: 6,222

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,500
CFM-CLG:	4,500
%OA:	20%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN

BLDG: 0313

BUILDING NAME: CIV PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,814.41	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	5,079.55	21.16	
Sub Total	3.12	15,360.69	21.16	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,172.04	63.08	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>16,532.73</b>	<b>84.24</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0313 BUILDING NAME: CIV PERS BLDG  
Building UA: 1,941 CONDITIONED SQFT: 6,222

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	14
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAHC:	0
HOAH:	0
COAHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 0313

BUILDING NAME: CIV PERS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	236.25	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	11.36	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>11.36</b>	<b>236.25</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 319**  
**GENERAL INSTRUCTION BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

Building UA:	2,244	CONDITIONED SQFT:	9,690
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	14,500
CFM-CLG:	14,500
%OA:	20%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,545.30	392.45	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	20,552.29	41.07	
Sub Total	10.99	56,740.41	433.51	
Economizer	0.00	2,667.42	0.00	
Ventilation/Recirculation	0.00	0.00	18.66	
DDC Control	0.00	3,126.73	42.95	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>10.99</b>	<b>62,534.56</b>	<b>495.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

Building UA:	2,244	CONDITIONED SQFT:	9,690
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	675,000
BLR CAP OUTPUT (BTUH):	540,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,023.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,489.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.83	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,489.82</b>	<b>3.83</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

Building UA:	2,244	CONDITIONED SQFT:	9,690
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760

CLG HRS SAVED:	2,460
HTG HRS SAVED:	3,936
C/H HRS SAVED:	6,414

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.04</b>	<b>437.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

Building UA:	2,244	CONDITIONED SQFT:	9,690
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0319

BUILDING NAME: GEN INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,616.91	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	7,129.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>7,129.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 330**  
**DEH ADMINISTRATION**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,500
CFM-CLG:	2,500
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	9,764.66	92.09	
Sub Total	2.47	17,892.32	92.09	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,410.96	30.30	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>20,303.27</b>	<b>122.39</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,000
CFM-CLG:	3,000
%OA:	0%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAHC:	27.8
HOAH:	44.6
COAHC:	0
COAUC:	0
HOAHC:	40.4
HOAHC:	65
COAHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	11,717.59	101.30	
Sub Total	2.47	19,845.25	101.30	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,893.15	33.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>22,738.40</b>	<b>134.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,950
CFM-CLG:	2,950
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	11,522.30	78.28	
Sub Total	2.47	19,649.96	78.28	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,844.93	25.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>22,494.88</b>	<b>104.03</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,950
CFM-CLG:	2,950
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**BLDG: 0330****BUILDING NAME: DEH ADMIN****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	11,522.30	78.28	
Sub Total	2.47	19,649.96	78.28	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,844.93	25.75	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>22,494.88</b>	<b>104.03</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA: 3,515

CONDITIONED SQFT: 14,913

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	875
CFM-CLG:	875
%OA:	0%
%Area:	3%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,472.16	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.47	0.00	0.00	
Night Setback	0.00	3,417.63	13.81	
Sub Total	0.47	4,959.80	13.81	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	843.83	4.54	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.47</b>	<b>5,803.64</b>	<b>18.36</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,000
CFM-CLG:	3,000
%OA:	0%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,758.69	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	11,717.59	101.30	
Sub Total	2.47	19,845.25	101.30	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,893.15	33.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>22,738.40</b>	<b>134.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	2
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	35.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	1.68	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.68</b>	<b>35.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330 BUILDING NAME: DEH ADMIN  
Building UA: 3,515 CONDITIONED SQFT: 14,913

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	2
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	35.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	1.68	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.68</b>	<b>35.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	2
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	35.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	1.68	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.68</b>	<b>35.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	52.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.52	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.52</b>	<b>52.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	2
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	35.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	1.68	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.68</b>	<b>35.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/DJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 0330

BUILDING NAME: DEH ADMIN

Building UA:	3,515	CONDITIONED SQFT:	14,913
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	2
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/DJ

BLDG: 0330

BUILDING NAME: DEH ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-6

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	35.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	1.68	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.68</b>	<b>35.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**BUILDING 364**  
**UEMCS HQ**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0364

BUILDING NAME: UEMCS HQ

Building UA:	676	CONDITIONED SQFT:	744
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	950
CFM-CLG:	950
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0364

BUILDING NAME: UEMCS HQ

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,472.16	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	3,710.57	88.56	
Sub Total	0.00	5,252.74	88.56	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	916.16	29.14	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,168.91</b>	<b>117.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0364

BUILDING NAME: UEMCS HQ

Building UA:	676	CONDITIONED SQFT:	744
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

BLDG: 0364

BUILDING NAME: UEMCS HQ

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	52.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.52	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.52</b>	<b>52.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 402**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	9,325
CFM-CLG:	9,325
%OA:	10%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	43.07	
<b>Sub Total</b>	<b>10.99</b>	<b>0.00</b>	<b>43.07</b>	
Economizer	0.00	8,250.39	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	7,310.99	85.68	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>15,561.37</b>	<b>128.75</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	11,800
CFM-CLG:	11,800
%OA:	10%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

**BLDG: 0402****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	0.00	53.84	
Sub Total	7.46	0.00	53.84	
Economizer	0.00	10,440.17	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	9,251.44	107.10	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>19,691.60</b>	<b>160.94</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	1,300
CFM-CLG:	1,300
%OA:	25%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	10.77	
<b>Sub Total</b>	<b>4.62</b>	<b>0.00</b>	<b>10.77</b>	
Economizer	0.00	1,150.19	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,019.23	21.42	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>2,169.41</b>	<b>32.19</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,627,500
BLR CAP OUTPUT (BTUH):	2,102,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0402****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-COL:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	65
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0402

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.93	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.93	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,137.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	54.70	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>55.62</b>	<b>1,137.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**BUILDING 403**  
**ADMINISTRATION GENERAL (DESIGN PREP)**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0403

BUILDING NAME: ADMIN GEN PURP

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.70
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	8,700
CFM-CLG:	8,700
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

BLDG: 0403

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	21,228.90	0.00	
Opt ST/SP	0.00	1,052.33	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.04	0.00	0.00	
Night Setback	0.00	32,599.68	332.22	
Sub Total	7.04	54,880.90	332.22	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>7.04</b>	<b>54,880.90</b>	<b>332.22</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0403****BUILDING NAME: ADMIN GEN PURP**

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	12,950
CFM-CLG:	12,950
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

BLDG: 0403

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	22,500.15	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	48,524.82	332.22	
Sub Total	7.46	72,140.31	332.22	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
TOTAL	7.46	72,140.31	332.22	0.00

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
TOTAL:		1	0	1	2	\$1,213.00

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0403****BUILDING NAME: ADMIN GEN PURP**

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.73
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**BLDG: 0403****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	15,477.45	0.00	
Opt ST/SP	0.00	1,250.16	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	16,727.62	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>16,727.62</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0403****BUILDING NAME: ADMIN GEN PURP**

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

BLDG: 0403

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,808.31	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	14,923.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,923.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0403****BUILDING NAME: ADMIN GEN PURP**

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.75
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: CWWAJN

BLDG: 0403

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	30,087.01	0.00	
Opt ST/SP	0.00	2,430.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	32,517.23	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>32,517.23</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWAJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0403****BUILDING NAME: ADMIN GEN PURP**

Building UA:	5,072	CONDITIONED SQFT:	18,151
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWVAJN

**BLDG: 0403****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	26,264.76	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	28,386.26	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>28,386.26</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 404**  
**ENLISTED BARRACKS W/DAS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0404 BUILDING NAME: ENL BARRACKS W/DAS  
Building UA: 5,697 CONDITIONED SQFT: 35,718

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	8,570
CFM-CLG:	8,570
%OA:	15%
%Area:	43%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	21.06	0.00	0.00	
Night Setback	0.00	0.00	46.30	
Sub Total	21.06	0.00	46.30	
Economizer	0.00	7,582.39	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	6,719.05	92.11	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.06</b>	<b>14,301.44</b>	<b>138.41</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	7,070
CFM-CLG:	7,070
%OA:	15%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	21.06	0.00	0.00	
Night Setback	0.00	0.00	37.69	
Sub Total	21.06	0.00	37.69	
Economizer	0.00	6,255.25	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	5,543.02	74.97	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.06</b>	<b>11,798.27</b>	<b>112.66</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	2,000
%OA:	15%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	10.77	
Sub Total	4.62	0.00	10.77	
Economizer	0.00	1,769.52	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,568.04	21.42	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>3,337.56</b>	<b>32.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0404 BUILDING NAME: ENL BARRACKS W/DAS  
Building UA: 5,697 CONDITIONED SQFT: 35,718

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	2,360
CFM-CLG:	2,360
%OA:	10%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	12.92	
Sub Total	4.62	0.00	12.92	
Economizer	0.00	2,088.03	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,850.29	25.70	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>3,938.32</b>	<b>38.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

Building UA: 5,697

CONDITIONED SQFT: 35,718

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	963,000
BLR CAP OUTPUT (BTUH):	770,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	45
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	787.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	37.87	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>39.60</b>	<b>787.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS****ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>17.49</b>	<b>350.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0404****BUILDING NAME: ENL BARRACKS W/DAS**

Building UA:	5,697	CONDITIONED SQFT:	35,718
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AMS/JM

BLDG: 0404

BUILDING NAME: ENL BARRACKS W/DAS

**ENERGY CALCULATION SUMMARY**

System Type: 27  
System Name: Perimeter radiation valve  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 405**  
**ADMINISTRATION GENERAL PURPOSE**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0405

BUILDING NAME: ADMIN GEN PURP

Building UA: 3,012

CONDITIONED SQFT: 10,778

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	100%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0405

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	684.20	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	14,988.36	256.47	
Sub Total	3.12	24,870.54	940.67	
Economizer	0.00	248.20	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	4,286.14	84.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>29,404.88</b>	<b>1,025.05</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0405 BUILDING NAME: ADMIN GEN PURP  
Building UA: 3,012 CONDITIONED SQFT: 10,778

**SYSTEM INFORMATION**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
4 SANDSTONE BLOCK ADMINISTRATION 0700-1700 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	960,000
BLR CAP OUTPUT (BTUH):	800,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0405****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.44	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.44</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0405****BUILDING NAME: ADMIN GEN PURP**

Building UA:	3,012	CONDITIONED SQFT:	10,778
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4.SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	58
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0405****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,015.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	48.81	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>48.81</b>	<b>1,015.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0405 BUILDING NAME: ADMIN GEN PURP  
 Building UA: 3,012 CONDITIONED SQFT: 10,778

**SYSTEM INFORMATION**

System Type: 24  
 System Name: Dual temperature water pump  
 System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	4.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0405****BUILDING NAME: ADMIN GEN PURP****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	18,830.90	0.00	
Opt ST/SP	0.00	933.46	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	6.24	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	6.24	19,764.35	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>6.24</b>	<b>19,764.35</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0405	BUILDING NAME: ADMIN GEN PURP
Building UA: 3,012	CONDITIONED SQFT: 10,778

**SYSTEM INFORMATION**

System Type: 19
System Name: Fan coil unit
System Number: FC-1

**TYPICAL BUILDING INFORMATION**

Category Number: 4	Construction: SANDSTONE BLOCK	Use: ADMINISTRATION	Occupancy HRS: 0700-1700	Occupancy Days: M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	3,200
CFM-CLG:	3,200
%OA:	0%
%Area:	19%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0405

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,864.26	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	11,990.69	74.97	
Sub Total	0.00	13,947.36	74.97	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,947.36</b>	<b>74.97</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0405	BUILDING NAME: ADMIN GEN PURP
Building UA: 3,012	CONDITIONED SQFT: 10,778

**SYSTEM INFORMATION**

System Type: 19
System Name: Fan coil unit
System Number: FC-2

**TYPICAL BUILDING INFORMATION**

Category Number: 4	Construction: SANDSTONE BLOCK	Use: ADMINISTRATION	Occupancy HRS: 0700-1700	Occupancy Days: M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	3,500
CFM-CLG:	3,500
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0405

BUILDING NAME: ADMIN GEN PURP

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,864.26	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	13,114.81	63.13	
Sub Total	0.00	15,071.49	63.13	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,071.49</b>	<b>63.13</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 406**  
**CID BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0406

BUILDING NAME: CID BLDG

Building UA:	3,389	CONDITIONED SQFT:	10,390
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**SYSTEM INFORMATION**

System Type:	33
System Name:	Multizone AHU with Humidification
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	6,130
CFM-CLG:	6,130
%OA:	10%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY: AJN/CWW

BLDG: 0406

BUILDING NAME: CID BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	33
System Name:	Multizone AHU with Humidification
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	33,141.02	104.85	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	22,969.66	443.96	
Sub Total	10.99	57,753.50	548.81	
Economizer	0.00	380.37	0.00	
Ventilation/Recirculation	0.00	0.00	5.20	
DDC Control	0.00	6,568.51	146.07	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>64,702.38</b>	<b>700.08</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
38	Direct digital control - Multizone AHU with Humidification	0	8	0	9	\$3,947.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>9</b>	<b>1</b>	<b>12</b>	<b>\$5,078.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0406

BUILDING NAME: CID BLDG

Building UA:	3,389	CONDITIONED SQFT:	10,390
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	688,000
BLR CAP OUTPUT (BTUH):	550,000

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0406

BUILDING NAME: CID BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0406 BUILDING NAME: CID BLDG  
 Building UA: 3,389 CONDITIONED SQFT: 10,390

**SYSTEM INFORMATION**

System Type: 8  
 System Name: Air cooled DX compressor  
 System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
 4 SANDSTONE BLOCK ADMINISTRATION 0700-1700 M-F  
 Weeks of Winter: 32  
 Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0406

BUILDING NAME: CID BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>16.83</b>	<b>350.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 409  
ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,950
CFM-CLG:	1,950
%OA:	14%
%Area:	11%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	10.90	
Sub Total	1.76	0.00	10.90	
Economizer	0.00	1,725.28	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,528.84	21.69	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>1.76</b>	<b>3,254.12</b>	<b>32.60</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,565
CFM-CLG:	3,565
%OA:	14%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	7.93	
<b>Sub Total</b>	<b>3.12</b>	<b>0.00</b>	<b>7.93</b>	
Economizer	0.00	3,154.17	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,795.03	15.78	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>3.12</b>	<b>5,949.20</b>	<b>23.71</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	6,115
CFM-CLG:	6,115
%OA:	14%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DCCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-3

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	15.86	
<b>Sub Total</b>	<b>4.62</b>	<b>0.00</b>	<b>15.86</b>	
Economizer	0.00	5,410.31	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	4,794.28	31.55	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>10,204.59</b>	<b>47.41</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0409****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	15,075
CFM-CLG:	15,075
%OA:	14%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	23.79	
Sub Total	10.99	0.00	23.79	
Economizer	0.00	13,337.76	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	11,819.10	47.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>25,156.86</b>	<b>71.12</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,186,000
BLR CAP OUTPUT (BTUH):	1,749,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	74
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,291.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	62.10	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>63.84</b>	<b>1,291.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0409****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 27  
System Name: Perimeter radiation valve  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.17
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	1,260
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0409****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 21

System Name: HW Unit heater

System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0409 BUILDING NAME: ENL BARRACKS W/AS  
 Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 21  
 System Name: HW Unit heater  
 System Number: UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	1,270
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0409

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 410**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,950
CFM-CLG:	1,950
%OA:	14%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	5.95	
Sub Total	1.76	0.00	5.95	
Economizer	0.00	1,725.28	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,528.84	11.83	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>1.76</b>	<b>3,254.12</b>	<b>17.78</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	12,375
CFM-CLG:	12,375
%OA:	14%
%Area:	29%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	28.75	
Sub Total	10.99	0.00	28.75	
Economizer	0.00	10,948.90	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	9,702.25	57.19	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>20,651.15</b>	<b>85.94</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	12,375
CFM-CLG:	12,375
%OA:	14%
%Area:	29%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	28.75	
Sub Total	10.99	0.00	28.75	
Economizer	0.00	10,948.90	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	9,702.25	57.19	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>20,651.15</b>	<b>85.94</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,186,000
BLR CAP OUTPUT (BTUH):	1,749,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0410****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	74
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,291.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	62.10	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>63.84</b>	<b>1,291.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA: 5,245

CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F: SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0410****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 27  
System Name: Perimeter radiation valve  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.16
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	1,260
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0410

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	1,270
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0410****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 411**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0411****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,950
CFM-CLG:	1,950
%OA:	14%
%Area:	11%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAHC:	8.06
HOAOH:	13
COAHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	0.00	10.90	
Sub Total	1.76	0.00	10.90	
Economizer	0.00	1,725.28	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,528.84	21.69	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>1.76</b>	<b>3,254.12</b>	<b>32.60</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,565
CFM-CLG:	3,565
%OA:	14%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	3.12	0.00	7.93	
Economizer	0.00	3,154.17	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,795.03	15.78	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>3.12</b>	<b>5,949.20</b>	<b>23.71</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	5,245	CONDITIONED SQFT:	32,883
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	6,115
CFM-CLG:	6,115
%OA:	14%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	15.86	
<b>Sub Total</b>	<b>4.62</b>	<b>0.00</b>	<b>15.86</b>	
Economizer	0.00	5,410.31	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	4,794.28	31.55	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>10,204.59</b>	<b>47.41</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411 BUILDING NAME: ENL BARRACKS W/AS  
 Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
 6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F; SAT-SUN

Weeks of Winter: 32  
 Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	15,075
CFM-CLG:	15,075
%OA:	14%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	0.00	23.79	
Sub Total	10.99	0.00	23.79	
Economizer	0.00	13,337.76	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	11,819.10	47.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>25,156.86</b>	<b>71.12</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0411****BUILDING NAME: ENL BARRACKS W/AS**

<b>Building UA:</b>	<b>5,245</b>	<b>CONDITIONED SQFT:</b>	<b>32,883</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	3
<b>System Name:</b>	Small steam boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	0.00
<b>HP Effic:</b>	0.00
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	2,186,000
<b>BLR CAP OUTPUT (BTUH):</b>	1,749,000

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	8.06
<b>HOAOH:</b>	13
<b>COAOHC:</b>	0.000274
<b>COAOC:</b>	0.000725
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000267
<b>ECHC:</b>	0.000101
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000895
<b>DDCCC:</b>	0.000237
<b>NSC:</b>	18900
<b>DDCH:</b>	37600
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTION NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 5,245 CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	74
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 6  
 System Name: Small air cooled chiller  
 System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,291.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	62.10	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>63.84</b>	<b>1,291.50</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411	BUILDING NAME: ENL BARRACKS W/AS
Building UA: 5,245	CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type: 21
System Name: HW Unit heater
System Number: UH-1

**TYPICAL BUILDING INFORMATION**

Category Number: 6	Construction: SANDSTONE BLOCK	Use: BARRACKS	Occupancy HRS: 0000-2400	Occupancy Days: M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.17
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	1,260
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0411	BUILDING NAME: ENL BARRACKS W/AS
Building UA: 5,245	CONDITIONED SQFT: 32,883

**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	1,270
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0411

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	0.00
Opt ST/SP	0.00	0.00	0.00	0.00
Duty Cycle	0.00	0.00	0.00	0.00
Demand Limit	0.00	0.00	0.00	0.00
Night Setback	0.00	0.00	7.93	
Sub Total	0.00	0.00	7.93	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.93</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 500**  
**POST HQ BUILDING**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0500****BUILDING NAME: POST HQ BLDG**

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	80.00
HP Effic:	0.91
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	4,250,000
BLR CAP OUTPUT (BTUH):	3,400,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760

CLG HRS SAVED:	0
HTG HRS SAVED:	0
C/H HRS SAVED:	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	16,072.76	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	16,072.76	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>16,072.76</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0500****BUILDING NAME: POST HQ BLDG**

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0500****BUILDING NAME: POST HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CT-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,115.34	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,115.34</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CT-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 26  
 System Name: Pump  
 System Number: CT-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,115.34	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,115.34</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

## ENERGY CALCULATION PARAMETERS

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA:	18,291	CONDITIONED SQFT:	65,453
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### SYSTEM INFORMATION

System Type:	22
System Name:	Heat pump unit
System Number:	HP-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

### INPUTS

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	6,960
CFM-CLG:	6,960
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### CONSTANTS

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,443.29	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	26,079.75	383.38	
Sub Total	0.00	33,892.01	383.38	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>33,892.01</b>	<b>383.38</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	8,300
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,443.29	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	31,100.85	407.34	
Sub Total	0.00	38,913.11	407.34	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>38,913.11</b>	<b>407.34</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	8,440
CFM-CLG:	8,440
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,944.40	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	31,625.44	359.42	
Sub Total	0.00	46,261.07	359.42	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>46,261.07</b>	<b>359.42</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA:	18,291	CONDITIONED SQFT:	65,453
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	13,760
CFM-CLG:	13,760
%OA:	0%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	22,500.15	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	51,559.96	431.30	
Sub Total	0.00	75,175.46	431.30	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>75,175.46</b>	<b>431.30</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500

BUILDING NAME: POST HQ BLDG

Building UA: 18,291

CONDITIONED SQFT: 65,453

**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4:SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	15,480
CFM-CLG:	15,480
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	22,500.15	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	58,004.95	479.22	
Sub Total	0.00	81,620.45	479.22	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>81,620.45</b>	<b>479.22</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0500 BUILDING NAME: POST HQ BLDG  
Building UA: 18,291 CONDITIONED SQFT: 65,453

**SYSTEM INFORMATION**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-6

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
4 SANDSTONE BLOCK ADMINISTRATION 0700-1700 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	9,750
CFM-CLG:	9,750
%OA:	0%
%Area:	14%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0500

BUILDING NAME: POST HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 22  
System Name: Heat pump unit  
System Number: HP-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,944.40	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	36,534.13	335.46	
Sub Total	0.00	51,169.76	335.46	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>51,169.76</b>	<b>335.46</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 509**  
**ADMINISTRATION GENERAL PURPOSE**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0509

BUILDING NAME: ADMIN GEN PURPOSE

Building UA:	2,825	CONDITIONED SQFT:	10,108
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**SYSTEM INFORMATION**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,440
CFM-CLG:	8,440
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUH:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0509

BUILDING NAME: ADMIN GEN PURPOSE

**ENERGY CALCULATION SUMMARY**

System Type:	22
System Name:	Heat pump unit
System Number:	HP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,443.29	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	31,625.44	370.08	
Sub Total	0.00	39,437.70	370.08	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>39,437.70</b>	<b>370.08</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 512**  
**SENIOR ENLISTED QUARTERS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0512****BUILDING NAME: SR ENL QTRS**

<b>Building UA:</b>	<b>2,172</b>	<b>CONDITIONED SQFT:</b>	<b>13,619</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	3.00
<b>HP Effic:</b>	0.79
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,250
<b>CFM-CLG:</b>	1,250
<b>%OA:</b>	10%
<b>%Area:</b>	8%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	8.06
<b>HOAOH:</b>	13
<b>COAOHC:</b>	0.000274
<b>COAOC:</b>	0.000725
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000267
<b>ECHC:</b>	0.000101
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000895
<b>DDCCC:</b>	0.000237
<b>NSC:</b>	18900
<b>DDCH:</b>	37600
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0512

BUILDING NAME: SR ENL QTRS

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	3.28	
Sub Total	4.62	0.00	3.28	
Economizer	0.00	1,105.95	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	980.02	6.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>2,085.97</b>	<b>9.82</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0512

BUILDING NAME: SR ENL QTRS

Building UA:	2,172	CONDITIONED SQFT:	13,619
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,611,000
BLR CAP OUTPUT (BTUH):	1,289,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760

CLG HRS SAVED:	0
HTG HRS SAVED:	0
C/H HRS SAVED:	0

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0512

BUILDING NAME: SR ENL QTRS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0512 BUILDING NAME: SR ENL QTRS  
Building UA: 2,172 CONDITIONED SQFT: 13,619

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0512****BUILDING NAME: SR ENL QTRS****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	175.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	8.42	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>8.42</b>	<b>175.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0512 BUILDING NAME: SR ENL QTRS  
Building UA: 2,172 CONDITIONED SQFT: 13,619

**SYSTEM INFORMATION**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0512

BUILDING NAME: SR ENL QTRS

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>26.42</b>	<b>525.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAF, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0512 BUILDING NAME: SR ENL QTRS  
Building UA: 2,172 CONDITIONED SQFT: 13,619

**SYSTEM INFORMATION**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,289,000
BLR CAP OUTPUT (BTUH):	1,289,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0512

BUILDING NAME: SR ENL QTRS

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	7.31	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.31</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>



**BUILDING 540**  
**OFFICERS QUARTERS MILIT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

Building UA: 3,238

CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	984,000
BLR CAP OUTPUT (BTUH):	828,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.58	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.58</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

Building UA: 3,238

CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 1

System Name: Small hot water boiler

System Number: BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	328,000
BLR CAP OUTPUT (BTUH):	276,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.86	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>1.86</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

Building UA: 3,238

CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 8

System Name: Air cooled DX compressor

System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	40
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	700.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	33.66	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>33.66</b>	<b>700.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0540 BUILDING NAME: OFF QTRS MILIT  
Building UA: 3,238 CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUHC:	0
NSUCC:	0
DCCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

**BLDG: 0540****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.43	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.43	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.43</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

Building UA:	3,238	CONDITIONED SQFT:	14,528
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN

BLDG: 0540

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 541**  
**OFFICERS QUARTERS MILIT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0541****BUILDING NAME: OFF QTRS MILIT****Building UA:** 3,933**CONDITIONED SQFT:** 18,083**SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	0.25
<b>HP Effic:</b>	0.65
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	984,000
<b>BLR CAP OUTPUT (BTUH):</b>	828,000

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	8.06
<b>HOAOH:</b>	13
<b>COAOHC:</b>	0.000274
<b>COAOC:</b>	0.000725
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000267
<b>ECHC:</b>	0.000101
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000895
<b>DDCCC:</b>	0.000237
<b>NSC:</b>	18900
<b>DDCH:</b>	37600
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0541

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.58	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.58</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0541****BUILDING NAME: OFF QTRS MILIT**

Building UA:	3,933	CONDITIONED SQFT:	18,083
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	328,000
BLR CAP OUTPUT (BTUH):	276,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0541

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.86	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>1.86</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0541

BUILDING NAME: OFF QTRS MILIT

Building UA: 3,933

CONDITIONED SQFT: 18,083

**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	40
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0541

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	700.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	33.66	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>33.66</b>	<b>700.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0541 BUILDING NAME: OFF QTRS MILIT  
Building UA: 3,933 CONDITIONED SQFT: 18,083

**SYSTEM INFORMATION**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
6 SANDSTONE BLOCK BARRACKS 0000-2400 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0541****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.43	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.43	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.43</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0541

BUILDING NAME: OFF QTRS MILIT

Building UA:	3,933	CONDITIONED SQFT:	18,083
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0541****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 542**  
**OFFICERS QUARTERS MILIT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0542****BUILDING NAME: OFF QTRS MILIT**

Building UA:	3,238	CONDITIONED SQFT:	14,528
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	984,000
BLR CAP OUTPUT (BTUH):	828,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0542

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.58	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.58</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0542

BUILDING NAME: OFF QTRS MILIT

Building UA:	3,238	CONDITIONED SQFT:	14,528
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
6	SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	328,000
BLR CAP OUTPUT (BTUH):	276,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0542

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.86	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>1.86</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0542	BUILDING NAME: OFF QTRS MILIT
Building UA: 3,238	CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 8
System Name: Air cooled DX compressor
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	40
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DCCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0542

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	700.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	33.66	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>33.66</b>	<b>700.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0542	BUILDING NAME: OFF QTRS MILIT
Building UA: 3,238	CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 24
System Name: Dual temperature water pump
System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number: 6	Construction: SANDSTONE BLOCK	Use: BARRACKS	Occupancy HRS: 0000-2400	Occupancy Days: M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0542****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.43	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.43	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.43</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0542	BUILDING NAME: OFF QTRS MILIT
Building UA: 3,238	CONDITIONED SQFT: 14,528

**SYSTEM INFORMATION**

System Type: 24
System Name: Dual temperature water pump
System Number: DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	6 SANDSTONE BLOCK	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	8.06
HOAOH:	13
COAOHC:	0.000274
COAOC:	0.000725
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000267
ECHC:	0.000101
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000895
DDCCC:	0.000237
NSC:	18900
DDCH:	37600
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0542

BUILDING NAME: OFF QTRS MILIT

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 602  
DENTAL CLINIC**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0602 BUILDING NAME: DENTAL CLINIC  
 Building UA: 1,060 CONDITIONED SQFT: 11,557

**SYSTEM INFORMATION**

System Type: 18  
 System Name: Dual Duct air handling unit  
 System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	25.00
HP Effic:	0.89
Load Factor:	0.80
CFM-HTG:	13,900
CFM-CLG:	13,900
%OA:	10%
%Area:	80%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	800	3,360
HTG HRS ON:	1,280	5,376
H/C HRS ON:	2,086	8,760
CLG HRS SAVED:	2,560	
HTG HRS SAVED:	4,096	
C/H HRS SAVED:	6,674	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0602****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type: 18  
System Name: Dual Duct air handling unit  
System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	122,612.89	465.72	
Opt ST/SP	0.00	5,090.16	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	13,266.48	30.53	
Sub Total	0.00	140,969.52	496.25	
Economizer	0.00	9,045.33	0.00	
Ventilation/Recirculation	0.00	512.98	21.28	
DDC Control	0.00	3,449.98	34.17	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>153,977.81</b>	<b>551.70</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
28	Direct digital control - Dual Duct AHU	1	7	0	9	\$3,761.00
34	Outside air damper ventilation and recirculation control - Dual Duct AHU	0	1	0	0	\$272.00
37	Outside air damper economizer control - Dual Duct AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>3</b>	<b>8</b>	<b>1</b>	<b>13</b>	<b>\$5,241.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0602 BUILDING NAME: DENTAL CLINIC  
Building UA: 1,060 CONDITIONED SQFT: 11,557

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	607,200
BLR CAP OUTPUT (BTUH):	506,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	800	3,360
HTG HRS ON:	1,280	5,376
H/C HRS ON:	2,086	8,760
CLG HRS SAVED:	2,560	
HTG HRS SAVED:	4,096	
C/H HRS SAVED:	6,674	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0602

BUILDING NAME: DENTAL CLINIC

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0602****BUILDING NAME: DENTAL CLINIC**

Building UA:	1,060	CONDITIONED SQFT:	11,557
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10/BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	78
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DCCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	800	3,360
HTG HRS ON:	1,280	5,376
H/C HRS ON:	2,086	8,760
CLG HRS SAVED:	2,560	
HTG HRS SAVED:	4,096	
C/H HRS SAVED:	6,674	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0602****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,917.46	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	4,384.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,368.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	65.81	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>66.98</b>	<b>5,752.68</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0602 BUILDING NAME: DENTAL CLINIC  
Building UA: 1,060 CONDITIONED SQFT: 11,557

**SYSTEM INFORMATION**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
10 BRICK AND CMU DENTAL CLINIC 0800-1700 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	500,000
BLR CAP OUTPUT (BTUH):	500,000

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	800	3,360
HTG HRS ON:	1,280	5,376
H/C HRS ON:	2,086	8,760
CLG HRS SAVED:	2,560	
HTG HRS SAVED:	4,096	
C/H HRS SAVED:	6,674	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0602

BUILDING NAME: DENTAL CLINIC

**ENERGY CALCULATION SUMMARY**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	940.19	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,010.20	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.84	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,010.20</b>	<b>2.84</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0602	BUILDING NAME: DENTAL CLINIC
Building UA: 1,060	CONDITIONED SQFT: 11,557

**SYSTEM INFORMATION**

System Type: 25
System Name: Hot water radiation pump
System Number: RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number: 10	Construction: BRICK AND CMU	Use: DENTAL CLINIC	Occupancy HRS: 0800-1700	Occupancy Days: M-F
Weeks of Winter: 32				
Weeks of Summer: 20				

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	800	3,360
HTG HRS ON:	1,280	5,376
H/C HRS ON:	2,086	8,760
CLG HRS SAVED:	2,560	
HTG HRS SAVED:	4,096	
C/H HRS SAVED:	6,674	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 0602

BUILDING NAME: DENTAL CLINIC

**ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	940.19	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,010.20	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,010.20</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 610**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0610 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 8,369 CONDITIONED SQFT: 29,004

**SYSTEM INFORMATION**

System Type: 7  
System Name: Large air cooled chiller  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
5BRICK AND CMU BARRACKS 0000-2400 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	116
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0610

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 7  
System Name: Large air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	2,030.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	97.61	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>100.41</b>	<b>2,030.00</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0610

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	8,369	CONDITIONED SQFT:	29,004
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	630,000
BLR CAP OUTPUT (BTUH):	630,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0610

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.57	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>3.57</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0610	BUILDING NAME: ENL BARRACKS W/AS
Building UA: 8,369	CONDITIONED SQFT: 29,004

**SYSTEM INFORMATION**

System Type: 24
System Name: Dual temperature water pump
System Number: DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
5	BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	10.00
HP Effic:	0.75
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0610

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	16.25	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	16.25	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>16.25</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0610 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 8,369 CONDITIONED SQFT: 29,004

**SYSTEM INFORMATION**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
5BRICK AND CMU BARRACKS 0000-2400 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP: 10.00  
HP Effic: 0.86  
Load Factor: 0.80  
CFM-HTG: 0  
CFM-CLG: 0  
%OA: 0%  
%Area: 0%  
CHILLER CAP (TONS): 0  
KW-TON: 0.00  
BLR CAP INPUT (BTUH): 0  
BLR CAP OUTPUT (BTUH): 0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC: 0  
HOAUH: 0  
COAUHC: 0  
COAUC: 0  
HOAOHC: 0  
HOAOH: 0  
COAOHC: 0  
COAOC: 0  
DC DUTY: 0.17  
DC DEMAND: 0.17  
ECC: 0  
ECHC: 0  
NSUCHC: 0  
NSUCC: 0  
DDCCHC: 0.0000556  
DDCCC: 0.000147  
NSC: 20000  
DDCH: 33900  
OPT: 0  
CHWR: 17.5  
CNWR: 0  
OAR: 5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0610

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	14.19	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>14.19</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 620**  
**OFFICERS QUARTERS MILIT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0620 BUILDING NAME: OFF QTRS MILIT  
Building UA: 4,410 CONDITIONED SQFT: 12,640

**SYSTEM INFORMATION**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	398,800
BLR CAP OUTPUT (BTUH):	398,800

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 0620****BUILDING NAME: OFF QTRS MILIT****ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.26	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>2.26</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>



**BUILDING 621**  
**OFFICERS QUARTERS TRANS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0621

BUILDING NAME: OFF QTRS TRANS

Building UA: 3,741

CONDITIONED SQFT: 10,723

**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	398,800
BLR CAP OUTPUT (BTUH):	398,800

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 0621

BUILDING NAME: OFF QTRS TRANS

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,800.21	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	4,800.21	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.26	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,800.21</b>	<b>2.26</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**BUILDINGS 650 AND 652  
COLD STORAGE FACILITIES**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0650

BUILDING NAME: COLD STOR FAC

Building UA:	2,000	CONDITIONED SQFT:	22,331
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**SYSTEM INFORMATION**

System Type:	30
System Name:	Cold Storage - Bldg 650
System Number:	CH-1 - 4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY: AJN/CWW

BLDG: 0650

BUILDING NAME: COLD STOR FAC

**ENERGY CALCULATION SUMMARY**

System Type:	30
System Name:	Cold Storage - Bldg 650
System Number:	CH-1 - 4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				34.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>34.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
45	Cold Storage - Bldg 650	0	0	0	13	\$2,452.00
<b>TOTAL:</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>\$2,452.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0652 BUILDING NAME: COLD STOR FAC  
Building UA: 1,000 CONDITIONED SQFT: 8,167

**SYSTEM INFORMATION**

System Type: 31  
System Name: Cold Storage - Bldg 652  
System Number: CH-1 - 4

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 0652

BUILDING NAME: COLD STOR FAC

**ENERGY CALCULATION SUMMARY**

System Type:	31
System Name:	Cold Storage - Bldg 652
System Number:	CH-1 - 4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				18.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>18.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
46	Cold Storage - Bldg 652	0	0	0	5	\$979.00
<b>TOTAL:</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>\$979.00</b>



**BUILDING 710**  
**TACTICAL EQUIPMENT SHOP**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAF, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

Building UA: 1,462

CONDITIONED SQFT: 2,173

**SYSTEM INFORMATION**

System Type: 8

System Name: Air cooled DX compressor

System Number: ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0710****BUILDING NAME: TAC EQUIP SHOP**

Building UA:	1,462	CONDITIONED SQFT:	2,173
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,000
CFM-CLG:	1,000
%OA:	22%
%Area:	19%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,546.09	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	991.13	3.03	
Sub Total	0.92	3,675.12	3.03	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	347.27	9.03	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>4,022.39</b>	<b>12.06</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

Building UA:	1,462	CONDITIONED SQFT:	2,173
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	400,000
BLR CAP OUTPUT (BTUH):	320,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,288.57	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,755.29	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.27	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,755.29</b>	<b>2.27</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0710 BUILDING NAME: TAC EQUIP SHOP  
 Building UA: 1,462 CONDITIONED SQFT: 2,173

**SYSTEM INFORMATION**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: MAU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,650
CFM-CLG:	1,650
%OA:	100%
%Area:	19%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,562.53	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,700.43	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,700.43</b>	<b>18.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0710****BUILDING NAME: TAC EQUIP SHOP**

Building UA:	1,462	CONDITIONED SQFT:	2,173
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	3,260
CFM-CLG:	0
%OA:	0%
%Area:	62%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0710

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,980.55	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	85.48	
Sub Total	0.00	3,243.59	85.48	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,243.59</b>	<b>85.48</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 720**  
**AF OPS BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0720

BUILDING NAME: AF OPS BLDG

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	0%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0720****BUILDING NAME: AF OPS BLDG****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,923.29	0.00	
Opt ST/SP	0.00	157.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	3,700.97	47.51	
Sub Total	0.92	6,781.60	47.51	
Economizer	0.00	1,160.45	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	503.83	21.56	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>8,445.87</b>	<b>69.07</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0720

BUILDING NAME: AF OPS BLDG

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	10%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0720

BUILDING NAME: AF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,266.62	17.92	
Opt ST/SP	0.00	157.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	3,700.97	47.51	
Sub Total	0.92	7,124.93	65.43	
Economizer	0.00	1,160.45	0.00	
Ventilation/Recirculation	0.00	18.48	0.96	
DDC Control	0.00	503.83	21.56	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>8,807.68</b>	<b>87.96</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0720****BUILDING NAME: AF OPS BLDG**

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	10%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0720

BUILDING NAME: AF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,266.62	17.92	
Opt ST/SP	0.00	157.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	3,700.97	47.51	
Sub Total	0.92	7,124.93	65.43	
Economizer	0.00	1,160.45	0.00	
Ventilation/Recirculation	0.00	18.48	0.96	
DDC Control	0.00	503.83	21.56	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>8,807.68</b>	<b>87.96</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0720

BUILDING NAME: AF OPS BLDG

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0720

BUILDING NAME: AF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0720

BUILDING NAME: AF OPS BLDG

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0720

BUILDING NAME: AF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0720

BUILDING NAME: AF OPS BLDG

Building UA:	1,587	CONDITIONED SQFT:	3,705
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	6	9	6	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0720

BUILDING NAME: AF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**BUILDING 722  
FLIGHT SIMULATOR**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722 BUILDING NAME: FLIGHT SIMULATOR  
 Building UA: 1,718 CONDITIONED SQFT: 7,000

**SYSTEM INFORMATION**

System Type: 11  
 System Name: Variable Air Volume air handling unit  
 System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	20.00
HP Effic:	0.88
Load Factor:	0.80
CFM-HTG:	15,590
CFM-CLG:	15,590
%OA:	25%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 11  
 System Name: Variable Air Volume air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	90,434.71	369.30	
Opt ST/SP	0.00	4,714.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	30,503.53	77.22	
<b>Sub Total</b>	<b>0.00</b>	<b>125,653.03</b>	<b>446.53</b>	
Economizer	0.00	11,421.35	0.00	
Ventilation/Recirculation	0.00	400.12	20.89	
DDC Control	0.00	4,958.73	35.05	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>142,433.23</b>	<b>502.46</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

Building UA:	1,718	CONDITIONED SQFT:	7,000
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	7,500
CFM-CLG:	7,500
%OA:	20%
%Area:	30%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0722****BUILDING NAME: FLIGHT SIMULATOR****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,029.03	142.13	
Opt ST/SP	0.00	300.12	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	14,674.56	46.33	
Sub Total	0.00	23,003.72	188.47	
Economizer	0.00	5,494.55	0.00	
Ventilation/Recirculation	0.00	153.99	8.04	
DDC Control	0.00	2,385.54	21.03	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>31,037.80</b>	<b>217.53</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

Building UA: 1,718

CONDITIONED SQFT: 7,000

**SYSTEM INFORMATION**

System Type: 15

System Name: Small Single Zone air handling unit

System Number: AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	4,050
CFM-CLG:	4,050
%OA:	25%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	46,838.09	95.94	
Opt ST/SP	0.00	2,545.18	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	7,924.26	30.89	
Sub Total	0.00	57,307.53	126.83	
Economizer	0.00	2,967.06	0.00	
Ventilation/Recirculation	0.00	103.94	5.43	
DDC Control	0.00	1,288.19	14.02	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>61,666.72</b>	<b>146.27</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722	BUILDING NAME: FLIGHT SIMULATOR
Building UA: 1,718	CONDITIONED SQFT: 7,000

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	6,400
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

Building UA:	1,718	CONDITIONED SQFT:	7,000
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	602,000
BLR CAP OUTPUT (BTUH):	480,100

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,195.05	0.00	
Opt ST/SP	0.00	788.68	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	8,983.73	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.41	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,983.73</b>	<b>3.41</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0722****BUILDING NAME: FLIGHT SIMULATOR**

Building UA:	1,718	CONDITIONED SQFT:	7,000
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,630.20	0.00	
Opt ST/SP	0.00	1,272.59	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	9,902.78	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>61.70</b>	<b>11,127.78</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

Building UA:	1,718	CONDITIONED SQFT:	7,000
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18/METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	16
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0722

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 6  
 System Name: Small air cooled chiller  
 System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**BUILDING 723  
MAINTENANCE HANGAR COMB**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

Building UA: 9,771

CONDITIONED SQFT: 21,640

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	90%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,254,000
BLR CAP OUTPUT (BTUH):	2,603,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000105
NSUC:	0.000278
DDCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

Building UA:	9,771	CONDITIONED SQFT:	21,640
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	832,960
BLR CAP OUTPUT (BTUH):	832,960

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.72	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>4.72</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvrtr; Optimum start/stop control - STM-HW Cnvrtr; Night setback - STM-HW Cnvrtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0723****BUILDING NAME: MNT HANGAR COMB****Building UA:** 9,771**CONDITIONED SQFT:** 21,640**SYSTEM INFORMATION**

<b>System Type:</b>	16
<b>System Name:</b>	Heating and Ventilating Unit
<b>System Number:</b>	HV-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	0.25
<b>HP Effic:</b>	0.65
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,600
<b>CFM-CLG:</b>	0
<b>%OA:</b>	100%
<b>%Area:</b>	10%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000105
<b>NSUCC:</b>	0.000278
<b>DDCCHC:</b>	0.000161
<b>DDCCC:</b>	0.000426
<b>NSC:</b>	94300
<b>DDCH:</b>	40600
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,000	3,360
<b>HTG HRS ON:</b>	1,600	5,376
<b>H/C HRS ON:</b>	2,607	8,760
<b>CLG HRS SAVED:</b>	2,360	
<b>HTG HRS SAVED:</b>	3,776	
<b>C/H HRS SAVED:</b>	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0723****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	866.74	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	92.14	
Sub Total	0.00	936.75	92.14	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	39.67	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>936.75</b>	<b>131.81</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0723****BUILDING NAME: MNT HANGAR COMB**

Building UA:	9,771	CONDITIONED SQFT:	21,640
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	32%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0723****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,414.42	0.00	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,690.21	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,690.21</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG:** 0723**BUILDING NAME:** MNT HANGAR COMB

<b>Building UA:</b>	9,771	<b>CONDITIONED SQFT:</b>	21,640
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**SYSTEM INFORMATION**

<b>System Type:</b>	27
<b>System Name:</b>	Perimeter radiation valve
<b>System Number:</b>	RAD-2

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	0.00
<b>HP Effic:</b>	0.00
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	25%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000105
<b>NSUCC:</b>	0.000278
<b>DDCCHC:</b>	0.000161
<b>DDCCC:</b>	0.000426
<b>NSC:</b>	94300
<b>DDCH:</b>	40600
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 27  
System Name: Perimeter radiation valve  
System Number: RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0723 BUILDING NAME: MNT HANGAR COMB  
Building UA: 9,771 CONDITIONED SQFT: 21,640

**SYSTEM INFORMATION**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effc:	0.65
Load Factor:	0.80
CFM-HTG:	740
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	866.74	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	73.71	
Sub Total	0.00	936.75	73.71	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>936.75</b>	<b>73.71</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0723****BUILDING NAME: MNT HANGAR COMB**

Building UA:	9,771	CONDITIONED SQFT:	21,640
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	740
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	866.74	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	73.71	
Sub Total	0.00	936.75	73.71	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>936.75</b>	<b>73.71</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

Building UA: 9,771

CONDITIONED SQFT: 21,640

**SYSTEM INFORMATION**

System Type: 21

System Name: HW Unit heater

System Number: UH-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	740
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0723

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	866.74	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	73.71	
Sub Total	0.00	936.75	73.71	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>936.75</b>	<b>73.71</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0723 BUILDING NAME: MNT HANGAR COMB  
Building UA: 9,771 CONDITIONED SQFT: 21,640

**SYSTEM INFORMATION**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	740
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0723****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	866.74	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	73.71	
Sub Total	0.00	936.75	73.71	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>936.75</b>	<b>73.71</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 724  
FLIGHT SIMULATOR**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0724 BUILDING NAME: FLIGHT SIMULATOR  
Building UA: 3,237 CONDITIONED SQFT: 13,188

**SYSTEM INFORMATION**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	6,200
CFM-CLG:	6,200
%OA:	10%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	35,718.34	61.24	
Opt ST/SP	0.00	1,874.43	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	12,645.00	174.60	
Sub Total	0.00	50,237.77	235.84	
Economizer	0.00	4,087.95	0.00	
Ventilation/Recirculation	0.00	63.65	3.32	
DDC Control	0.00	1,774.84	79.24	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>56,164.20</b>	<b>318.41</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0724****BUILDING NAME: FLIGHT SIMULATOR**

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	6,000
CFM-CLG:	6,000
%OA:	10%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	35,680.50	59.26	
Opt ST/SP	0.00	1,874.43	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	12,237.09	116.40	
Sub Total	0.00	49,792.02	175.66	
Economizer	0.00	3,956.08	0.00	
Ventilation/Recirculation	0.00	61.60	3.22	
DDC Control	0.00	1,717.59	52.83	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>55,527.28</b>	<b>231.71</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	450,000
BLR CAP OUTPUT (BTUH):	360,000

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,557.66	0.00	
Opt ST/SP	0.00	788.68	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,346.34	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.55	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,346.34</b>	<b>2.55</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,575.17	0.00	
Opt ST/SP	0.00	788.68	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	6,363.85	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>22.77</b>	<b>6,801.35</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0724 BUILDING NAME: FLIGHT SIMULATOR  
Building UA: 3,237 CONDITIONED SQFT: 13,188

**SYSTEM INFORMATION**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
18 METAL PANEL AND CMU SIMULATOR BLDG 0600-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,121.57	0.00	
Opt ST/SP	0.00	300.12	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	2,421.70	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>17.49</b>	<b>2,771.70</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0724****BUILDING NAME: FLIGHT SIMULATOR**

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0724****BUILDING NAME: FLIGHT SIMULATOR****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0724 BUILDING NAME: FLIGHT SIMULATOR  
Building UA: 3,237 CONDITIONED SQFT: 13,188

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
18	METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0724****BUILDING NAME: FLIGHT SIMULATOR**

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	CRU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	8,600
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAOHC:	15.5
HOAOH:	25
COAOHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: CRU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0724****BUILDING NAME: FLIGHT SIMULATOR**

Building UA:	3,237	CONDITIONED SQFT:	13,188
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	CRU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	18 METAL PANEL AND CMU	SIMULATOR BLDG	0600-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	8,600
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	15.4
HOAUH:	24.8
COAUHC:	0.000295
COAUC:	0.000779
HOAHC:	15.5
HOAHC:	25
COAHC:	0.000155
COAOC:	0.00041
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000743
ECHC:	0.000281
NSUCHC:	0.000318
NSUCC:	0.000842
DDCCHC:	0.000122
DDCCC:	0.000321
NSC:	89900
DDCH:	40800
OPT:	348
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0724

BUILDING NAME: FLIGHT SIMULATOR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	CRU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**BUILDING 727**  
**MAINTENANCE HANGAR COMB**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	16
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	280.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	13.46	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>13.46</b>	<b>280.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA: 13,826

CONDITIONED SQFT: 36,152

**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	15
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 8  
 System Name: Air cooled DX compressor  
 System Number: ACCU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	262.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	12.62	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>12.62</b>	<b>262.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727 BUILDING NAME: MNT HANGAR COMB  
Building UA: 13,826 CONDITIONED SQFT: 36,152

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	5,160
CFM-CLG:	5,160
%OA:	10%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	24,304.07	53.61	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	31,141.48	60.72	
Sub Total	7.46	56,560.89	114.34	
Economizer	0.00	962.55	0.00	
Ventilation/Recirculation	0.00	40.45	2.55	
DDC Control	0.00	2,821.06	49.94	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>60,384.95</b>	<b>166.83</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,175
CFM-CLG:	1,175
%OA:	10%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,724.92	12.21	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	7,091.33	25.30	
Sub Total	1.76	13,079.28	37.51	
Economizer	0.00	219.19	0.00	
Ventilation/Recirculation	0.00	9.21	0.58	
DDC Control	0.00	642.39	20.81	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>13,950.07</b>	<b>58.90</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	4,181,000
BLR CAP OUTPUT (BTUH):	3,350,000

**OURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DCCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.72
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	450,000
BLR CAP OUTPUT (BTUH):	360,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,855.96	0.00	
Opt ST/SP	0.00	763.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	10,619.70	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.55	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>10,619.70</b>	<b>2.55</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG:** 0727**BUILDING NAME:** MNT HANGAR COMB

<b>Building UA:</b>	13,826	<b>CONDITIONED SQFT:</b>	36,152
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**SYSTEM INFORMATION**

<b>System Type:</b>	5
<b>System Name:</b>	Steam to hot water converter
<b>System Number:</b>	CV-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

<b>Motor HP:</b>	1.00
<b>HP Effic:</b>	0.69
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	33%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	1,000,000
<b>BLR CAP OUTPUT (BTUH):</b>	1,000,000

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000105
<b>NSUCC:</b>	0.000278
<b>DDCCHC:</b>	0.000161
<b>DDCCC:</b>	0.000426
<b>NSC:</b>	94300
<b>DDCH:</b>	40600
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	900	3,360
<b>HTG HRS ON:</b>	1,440	5,376
<b>H/C HRS ON:</b>	2,346	8,760
<b>CLG HRS SAVED:</b>	2,460	
<b>HTG HRS SAVED:</b>	3,936	
<b>C/H HRS SAVED:</b>	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,394.52	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,657.56	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.67	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,657.56</b>	<b>5.67</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvrtr; Optimum start/stop control - STM-HW Cnvrtr; Night setback - STM-HW Cnvrtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	0
%OA:	100%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,779.55	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	104.30	
Sub Total	0.00	1,917.45	104.30	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	44.91	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,917.45</b>	<b>149.21</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
4	SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0727****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,522.99	0.00	
Opt ST/SP	0.00	737.94	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	10,260.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>10,260.93</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0727****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,192.57	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	97.78	
Sub Total	0.00	1,284.98	97.78	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,284.98</b>	<b>97.78</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0727****BUILDING NAME: MNT HANGAR COMB**

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	2,800
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,192.57	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	97.78	
Sub Total	0.00	1,284.98	97.78	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,284.98</b>	<b>97.78</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,192.57	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	97.78	
Sub Total	0.00	1,284.98	97.78	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,284.98</b>	<b>97.78</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

Building UA:	13,826	CONDITIONED SQFT:	36,152
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0727

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,192.57	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	97.78	
Sub Total	0.00	1,284.98	97.78	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,284.98</b>	<b>97.78</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**BUILDING 741**  
**MAINTENANCE HANGAR COMB**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

Building UA: 14,876

CONDITIONED SQFT: 38,898

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	14,200
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,393.41	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	350.70	
Sub Total	0.00	15,508.75	350.70	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	150.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,508.75</b>	<b>501.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0741	BUILDING NAME: MNT HANGAR COMB
Building UA: 14,876	CONDITIONED SQFT: 38,898

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	14,200
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,393.41	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	350.70	
Sub Total	0.00	15,508.75	350.70	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	150.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,508.75</b>	<b>501.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

Building UA:	14,876	CONDITIONED SQFT:	38,898
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	14,200
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-3

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,393.41	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	350.70	
Sub Total	0.00	15,508.75	350.70	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	150.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,508.75</b>	<b>501.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

Building UA: 14,876

CONDITIONED SQFT: 38,898

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	14,200
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,393.41	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	350.70	
Sub Total	0.00	15,508.75	350.70	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	150.99	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,508.75</b>	<b>501.69</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0741

BUILDING NAME: MNT HANGAR COMB

Building UA: 14,876

CONDITIONED SQFT: 38,898

**SYSTEM INFORMATION**

System Type:	4
System Name:	Large steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	7,071,000
BLR CAP OUTPUT (BTUH):	5,657,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**BLDG: 0741****BUILDING NAME: MNT HANGAR COMB****ENERGY CALCULATION SUMMARY**

System Type: 4  
System Name: Large steam boiler  
System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	670.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				26.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>670.00</b>	<b>26.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
6	Remote Boiler Monitoring - STM Boiler	0	0	4	4	\$5,286.00
<b>TOTAL:</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>\$5,286.00</b>

**BUILDING 751  
AC PTS & TOE ST**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0751****BUILDING NAME: AC PTS & TOE ST**

Building UA:	3,641	CONDITIONED SQFT:	9,834
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	1,200
CFM-CLG:	1,200
%OA:	10%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/CWW

BLDG: 0751

BUILDING NAME: AC PTS &amp; TOE ST

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,864.26	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.62	0.00	0.00	
Night Setback	0.00	1,668.65	33.90	
<b>Sub Total</b>	<b>0.62</b>	<b>3,625.33</b>	<b>33.90</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	58.82	10.89	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.62</b>	<b>3,684.14</b>	<b>44.78</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM/AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0751 BUILDING NAME: AC PTS & TOE ST  
Building UA: 3,641 CONDITIONED SQFT: 9,834

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	770,000
BLR CAP OUTPUT (BTUH):	616,000

**OURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: JM/AJN/CWW

BLDG: 0751

BUILDING NAME: AC PTS &amp; TOE ST

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0751****BUILDING NAME: AC PTS & TOE ST**

Building UA:	3,641	CONDITIONED SQFT:	9,834
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/CWW

BLDG: 0751

BUILDING NAME: AC PTS &amp; TOE ST

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	52.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.52	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.52</b>	<b>52.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0751

BUILDING NAME: AC PTS &amp; TOE ST

Building UA:	3,641	CONDITIONED SQFT:	9,834
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	0
%OA:	0%
%Area:	90%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/CWW

BLDG: 0751

BUILDING NAME: AC PTS &amp; TOE ST

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,557.66	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	305.08	
Sub Total	0.00	9,248.89	305.08	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
TOTAL	0.00	9,248.89	305.08	0.00

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
TOTAL:		1	0	1	2	\$1,213.00

**BUILDING 760**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 09-Dec-95  
 PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0760 BUILDING NAME: BN HQ BLDG  
 Building UA: 3,399 CONDITIONED SQFT: 7,364

**SYSTEM INFORMATION**

System Type: 3  
 System Name: Small steam boiler  
 System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:		32		
Weeks of Summer:		20		

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	672,000
BLR CAP OUTPUT (BTUH):	558,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 09-Dec-95

PREPARED BY: JM

BLDG: 0760

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0760	BUILDING NAME: BN HQ BLDG
Building UA: 3,399	CONDITIONED SQFT: 7,364

**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0760

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 802**  
**BN ADMINISTRATION & CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0802

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA:	5,781	CONDITIONED SQFT:	12,526
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	30.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	7,605
CFM-CLG:	7,605
%OA:	10%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0802

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	131,523.17	77.73	
Opt ST/SP	0.00	6,298.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	42.13	0.00	0.00	
Night Setback	0.00	45,151.17	211.58	
Sub Total	42.13	182,972.75	289.32	
Economizer	0.00	1,481.70	0.00	
Ventilation/Recirculation	0.00	59.61	3.76	
DDC Control	0.00	4,342.58	174.01	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>42.13</b>	<b>188,856.63</b>	<b>467.08</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0802****BUILDING NAME: BN ADMIN & CLRM**

Building UA: 5,781

CONDITIONED SQFT: 12,526

**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0802

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,094.13	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.35	1,232.03	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>1,232.03</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0802 BUILDING NAME: BN ADMIN & CLRM  
 Building UA: 5,781 CONDITIONED SQFT: 12,526

**SYSTEM INFORMATION**

System Type: 26  
 System Name: Pump  
 System Number: HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
 7 BRICK AND CMU BATTALION 0700-1800 M-F; SAT  
 Weeks of Winter: 32  
 Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0802

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,501.23	0.00	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,777.02	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,777.02</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**BUILDING 804**  
**REGIMENTAL HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0804

BUILDING NAME: RGT HQ BUILD

Building UA:	2,665	CONDITIONED SQFT:	10,241
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	5,575
CFM-CLG:	5,575
%OA:	15%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0804

BUILDING NAME: RGT HQ BUILD

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	33,983.59	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	6,190.67	29.05	
Sub Total	10.99	41,817.08	29.05	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,516.56	86.61	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>43,333.64</b>	<b>115.66</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0804

BUILDING NAME: RGT HQ BUILD

Building UA:	2,665	CONDITIONED SQFT:	10,241
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2/BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0804

BUILDING NAME: RGT HQ BUILD

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,557.69	0.00	
Opt ST/SP	0.00	413.69	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.77	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.77	8,971.38	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.77</b>	<b>8,971.38</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**BUILDING 806  
COMBINATION AC-HTG PLANT**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0806

BUILDING NAME: COMB AC-HTG PLANT

Building UA: 500

CONDITIONED SQFT: 1,000

**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	20.00
HP Effic:	0.88
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,600,000
BLR CAP OUTPUT (BTUH):	1,391,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY:

BLDG: 0806

BUILDING NAME: COMB AC-HTG PLANT

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	4,132.21	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	4,132.21	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	9.07	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,132.21</b>	<b>9.07</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0806 BUILDING NAME: COMB AC-HTG PLANT  
Building UA: 500 CONDITIONED SQFT: 1,000

**SYSTEM INFORMATION**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP: 20.00  
HP Effic: 0.88  
Load Factor: 0.80  
CFM-HTG: 0  
CFM-CLG: 0  
%OA: 0%  
%Area: 0%  
CHILLER CAP (TONS): 0  
KW-TON: 0.00  
BLR CAP INPUT (BTUH): 1,600,000  
BLR CAP OUTPUT (BTUH): 1,391,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC: 0  
HOAUH: 0  
COAUHC: 0  
COAUC: 0  
HOAOHC: 0  
HOAOH: 0  
COAOHC: 0  
COAOC: 0  
DC DUTY: 0.17  
DC DEMAND: 0.17  
ECC: 0  
ECHC: 0  
NSUCHC: 0.000105  
NSUCC: 0.000278  
DDCCHC: 0.000161  
DDCCC: 0.000426  
NSC: 94300  
DDCH: 40600  
OPT: 305  
CHWR: 17.5  
CNWR: 0  
OAR: 5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0806

BUILDING NAME: COMB AC-HTG PLANT

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	4,132.21	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	4,132.21	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	9.07	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,132.21</b>	<b>9.07</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0806

BUILDING NAME: COMB AC-HTG PLANT

Building UA:	500	CONDITIONED SQFT:	1,000
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0806

BUILDING NAME: COMB AC-HTG PLANT

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	3,149.20	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.90	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	7.90	3,149.20	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>66.80</b>	<b>4,374.20</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

## ENERGY CALCULATION PARAMETERS

BLDG: 0806 BUILDING NAME: COMB AC-HTG PLANT  
Building UA: 500 CONDITIONED SQFT: 1,000

### SYSTEM INFORMATION

System Type: 7  
System Name: Large air cooled chiller  
System Number: CH-2

### TYPICAL BUILDING INFORMATION

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

### INPUTS

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### CONSTANTS

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**BLDG: 0806****BUILDING NAME: COMB AC-HTG PLANT****ENERGY CALCULATION SUMMARY**

System Type: 7  
System Name: Large air cooled chiller  
System Number: CH-2

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	3,149.20	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.90	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	7.90	3,149.20	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>66.80</b>	<b>4,374.20</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**BUILDING 808**  
**BN ADMINISTRATION & CLASSROOM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0808

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA: 5,781

CONDITIONED SQFT: 12,526

**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	30.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	7,605
CFM-CLG:	7,605
%OA:	10%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0808

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	131,523.17	77.73	
Opt ST/SP	0.00	6,298.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	42.13	0.00	0.00	
Night Setback	0.00	45,151.17	211.58	
Sub Total	42.13	182,972.75	289.32	
Economizer	0.00	1,481.70	0.00	
Ventilation/Recirculation	0.00	59.61	3.76	
DDC Control	0.00	4,342.58	174.01	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>42.13</b>	<b>188,856.63</b>	<b>467.08</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0808

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA:	5,781	CONDITIONED SQFT:	12,526
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0808

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,094.13	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.35	1,232.03	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>1,232.03</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0808	BUILDING NAME: BN ADMIN & CLRM
Building UA: 5,781	CONDITIONED SQFT: 12,526

**SYSTEM INFORMATION**

System Type: 26
System Name: Pump
System Number: HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	7	8	7	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	940	3,360
HTG HRS ON:	1,504	5,376
H/C HRS ON:	2,451	8,760
CLG HRS SAVED:	2,420	
HTG HRS SAVED:	3,872	
C/H HRS SAVED:	6,309	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0808

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,501.23	0.00	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,777.02	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,777.02</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 810**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0810****BUILDING NAME: ADMIN & SUPPLY BLDG**

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,623.31	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	5,314.54	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.73</b>	<b>5,314.54</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3/BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.73
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	21,800.30	0.00	
Opt ST/SP	0.00	1,250.16	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	8.36	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	8.36	23,050.46	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>8.36</b>	<b>23,050.46</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0810	BUILDING NAME: ADMIN & SUPPLY BLDG
Building UA: 4,538	CONDITIONED SQFT: 151,520

**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	12,053.63	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.62	12,744.86	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>12,744.86</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	8,000
%OA:	15%
%Area:	37%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,586.88	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	9,615.98	155.48	
Sub Total	0.00	14,465.90	155.48	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,465.90</b>	<b>155.48</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0810****BUILDING NAME: ADMIN & SUPPLY BLDG**

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,814.96	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	66.75	
Sub Total	0.00	3,078.00	66.75	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	21.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,078.00</b>	<b>88.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0810****BUILDING NAME: ADMIN & SUPPLY BLDG**

<b>Building UA:</b>	<b>4,538</b>	<b>CONDITIONED SQFT:</b>	<b>151,520</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>16</b>
<b>System Name:</b>	<b>Heating and Ventilating Unit</b>
<b>System Number:</b>	<b>HV-2</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>3 BRICK AND CMU</b>	<b>ADMIN &amp; SUPPLY</b>	<b>0700-1600</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	6	7	6	7	6	0
<b>REQ STOP:</b>	0	20	19	20	19	20	0

**INPUTS**

<b>Motor HP:</b>	<b>1.00</b>
<b>HP Effic:</b>	<b>0.69</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>2,400</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>100%</b>
<b>%Area:</b>	<b>16%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0.000226</b>
<b>NSUCC:</b>	<b>0.000598</b>
<b>DDCCHC:</b>	<b>0.0000188</b>
<b>DDCCC:</b>	<b>0.0000498</b>
<b>NSC:</b>	<b>93100</b>
<b>DDCH:</b>	<b>29900</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,320</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>2,112</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>3,441</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,040</b>	
<b>HTG HRS SAVED:</b>	<b>3,264</b>	
<b>C/H HRS SAVED:</b>	<b>5,319</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,814.96	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	66.75	
Sub Total	0.00	3,078.00	66.75	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	21.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,078.00</b>	<b>88.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 0810****BUILDING NAME: ADMIN & SUPPLY BLDG**

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: HV-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,814.96	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	66.75	
Sub Total	0.00	3,078.00	66.75	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	21.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,078.00</b>	<b>88.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

Building UA:	4,538	CONDITIONED SQFT:	151,520
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	20	19	20	19	20	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,320	3,360
HTG HRS ON:	2,112	5,376
H/C HRS ON:	3,441	8,760
CLG HRS SAVED:	2,040	
HTG HRS SAVED:	3,264	
C/H HRS SAVED:	5,319	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 0810

BUILDING NAME: ADMIN &amp; SUPPLY BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,814.96	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	66.75	
Sub Total	0.00	3,078.00	66.75	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	21.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,078.00</b>	<b>88.19</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 812**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.72
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	16,190.51	0.00	
Opt ST/SP	0.00	763.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	5.11	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	5.11	16,954.25	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>5.11</b>	<b>16,954.25</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0812

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
3	BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,653.44	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.62	15,344.67	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>15,344.67</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	9,000
CFM-CLG:	1,800
%OA:	10%
%Area:	37%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,576.21	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,630.25	243.06	
Sub Total	0.00	8,469.50	243.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,469.50</b>	<b>243.06</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0812 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 7,056 CONDITIONED SQFT: 23,559

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,820
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,800.21	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	82.77	
Sub Total	0.00	5,169.18	82.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,169.18</b>	<b>109.35</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,820
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,821.77	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	82.77	
Sub Total	0.00	8,190.73	82.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,190.73</b>	<b>109.35</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0812

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,820
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0812

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,821.77	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	82.77	
Sub Total	0.00	8,190.73	82.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,190.73</b>	<b>109.35</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	7,056	CONDITIONED SQFT:	23,559
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,820
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000226
NSUC:	0.000598
DDCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0812

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,821.77	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	82.77	
Sub Total	0.00	8,190.73	82.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,190.73</b>	<b>109.35</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG**

<b>Building UA:</b>	<b>7,056</b>	<b>CONDITIONED SQFT:</b>	<b>23,559</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>16</b>
<b>System Name:</b>	<b>Heating and Ventilating Unit</b>
<b>System Number:</b>	<b>HV-5</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>3BRICK AND CMU</b>	<b>ADMIN &amp; SUPPLY</b>	<b>0700-1600</b>	<b>M-F</b>
<b>Weeks of Winter:</b>	<b>32</b>			
<b>Weeks of Summer:</b>	<b>20</b>			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	9	7	9	7	9	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	<b>1.50</b>
<b>HP Effic:</b>	<b>0.74</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>2,820</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>100%</b>
<b>%Area:</b>	<b>13%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0.000226</b>
<b>NSUCC:</b>	<b>0.000598</b>
<b>DDCCHC:</b>	<b>0.0000188</b>
<b>DDCCC:</b>	<b>0.0000498</b>
<b>NSC:</b>	<b>93100</b>
<b>DDCH:</b>	<b>29900</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>880</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,408</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,294</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,480</b>	
<b>HTG HRS SAVED:</b>	<b>3,968</b>	
<b>C/H HRS SAVED:</b>	<b>6,466</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0812****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-5

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,821.77	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	82.77	
Sub Total	0.00	8,190.73	82.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,190.73</b>	<b>109.35</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 814**  
**MEDICAL FACILITY - NEW**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0814

BUILDING NAME: MEDICAL FAC - NEW

Building UA:	1,449	CONDITIONED SQFT:	9,220
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	5,000
CFM-CLG:	5,000
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW****ENERGY CALCULATION SUMMARY**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	46,185.93	482.94	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	4,585.70	18.26	
Sub Total	10.99	52,414.45	501.20	
Economizer	0.00	3,660.43	0.00	
Ventilation/Recirculation	0.00	553.57	22.97	
DDC Control	0.00	1,396.12	20.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>58,024.58</b>	<b>544.60</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW**

Building UA:	1,449	CONDITIONED SQFT:	9,220
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10 BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	707,500
BLR CAP OUTPUT (BTUH):	566,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0814

BUILDING NAME: MEDICAL FAC - NEW

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,023.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,489.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.01	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,489.82</b>	<b>4.01</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW**

Building UA: 1,449

CONDITIONED SQFT: 9,220

**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10 BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0814

BUILDING NAME: MEDICAL FAC - NEW

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,135.57	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.29	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.29	4,648.32	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>18.12</b>	<b>4,998.32</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW**

Building UA: 1,449

CONDITIONED SQFT: 9,220

**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,764.43	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	4,231.16	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.17</b>	<b>4,231.16</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW**

Building UA:	1,449	CONDITIONED SQFT:	9,220
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	15	15	15	15	15	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	65%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0814****BUILDING NAME: MEDICAL FAC - NEW****ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,023.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,489.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,489.82</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 817**  
**MAINTENANCE HANGAR AVUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817	BUILDING NAME: MNT HANGAR AVUM
Building UA: 9,255	CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,330
CFM-CLG:	1,330
%OA:	15%
%Area:	2%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,071.06	19.72	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	7,635.23	6.77	
Sub Total	0.92	10,844.18	26.49	
Economizer	0.00	281.18	0.00	
Ventilation/Recirculation	0.00	15.64	0.99	
DDC Control	0.00	824.09	5.57	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>11,965.08</b>	<b>33.05</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,255 CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7/BRICK AND CMU BATTALION 0700-1800 M-F; SAT  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,200
CFM-CLG:	1,200
%OA:	15%
%Area:	2%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,040.48	17.79	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	6,888.93	6.77	
Sub Total	0.92	10,067.30	24.56	
Economizer	0.00	253.70	0.00	
Ventilation/Recirculation	0.00	14.11	0.89	
DDC Control	0.00	743.54	5.57	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>11,078.65</b>	<b>31.03</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	2,400
%OA:	15%
%Area:	3%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-3

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,944.65	35.58	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	13,777.85	10.16	
Sub Total	2.47	22,091.47	45.74	
Economizer	0.00	507.39	0.00	
Ventilation/Recirculation	0.00	28.22	1.78	
DDC Control	0.00	1,487.07	8.36	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>24,114.16</b>	<b>55.88</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,769,000
BLR CAP OUTPUT (BTUH):	3,015,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,294.14	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,806.88	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	21.37	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,806.88</b>	<b>21.37</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,255 CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F; SAT

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817	BUILDING NAME: MNT HANGAR AVUM
Building UA: 9,255	CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type: 8
System Name: Air cooled DX compressor
System Number: CH-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	8
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	140.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	6.73	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>6.73</b>	<b>140.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,255 CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	14,678
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: H&V-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	26,042.18	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.64	
Sub Total	0.00	28,163.67	43.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>28,163.67</b>	<b>62.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS****BLDG: 0817****BUILDING NAME: MNT HANGAR AVUM**

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	14,678
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	26,042.18	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.64	
Sub Total	0.00	28,163.67	43.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>28,163.67</b>	<b>62.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA: 9,255      CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	14,678
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: H&V-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	26,042.18	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.64	
Sub Total	0.00	28,163.67	43.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>28,163.67</b>	<b>62.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	14,678
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	26,042.18	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.64	
Sub Total	0.00	28,163.67	43.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>28,163.67</b>	<b>62.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS****BLDG: 0817****BUILDING NAME: MNT HANGAR AVUM**

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-5

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,800
CFM-CLG:	0
%OA:	100%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-5

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,729.28	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	69.82	
Sub Total	0.00	6,196.01	69.82	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	30.06	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,196.01</b>	<b>99.88</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA: 9,255

CONDITIONED SQFT: 40,061

**SYSTEM INFORMATION**

System Type: 16

System Name: Heating and Ventilating Unit

System Number: H&amp;V-6

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	2,800
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,529.23	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.64	
Sub Total	0.00	4,898.20	43.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,898.20</b>	<b>62.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13/METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,729.28	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,196.01	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,196.01</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,255	CONDITIONED SQFT:	40,061
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	7	6	7	6	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.43
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,020	3,360
HTG HRS ON:	1,632	5,376
H/C HRS ON:	2,659	8,760
CLG HRS SAVED:	2,340	
HTG HRS SAVED:	3,744	
C/H HRS SAVED:	6,101	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000105
NSUC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0817

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	52,083.76	0.00	
Opt ST/SP	0.00	4,242.93	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	56,326.69	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>56,326.69</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 820**  
**TACTICAL EQUIPMENT SHOP**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0820****BUILDING NAME: TAC EQUIP SHOP**

Building UA:	8,561	CONDITIONED SQFT:	20,564
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7-BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	12
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	210.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	10.10	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>10.10</b>	<b>210.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0820****BUILDING NAME: TAC EQUIP SHOP**

Building UA:	8,561	CONDITIONED SQFT:	20,564
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	4,800
CFM-CLG:	4,800
%OA:	12%
%Area:	45%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	49,023.75	61.31	
Opt ST/SP	0.00	2,230.69	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.92	0.00	0.00	
Night Setback	0.00	29,675.38	141.00	
Sub Total	14.92	80,929.81	202.31	
Economizer	0.00	835.70	0.00	
Ventilation/Recirculation	0.00	45.15	2.85	
DDC Control	0.00	2,449.30	115.96	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>14.92</b>	<b>84,259.96</b>	<b>321.11</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0820 BUILDING NAME: TAC EQUIP SHOP  
Building UA: 8,561 CONDITIONED SQFT: 20,564

**SYSTEM INFORMATION**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,898,000
BLR CAP OUTPUT (BTUH):	2,318,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	28,045.43	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	30,166.92	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	16.43	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>30,166.92</b>	<b>16.43</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0820 BUILDING NAME: TAC EQUIP SHOP  
Building UA: 8,561 CONDITIONED SQFT: 20,564

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	3,400
CFM-CLG:	0
%OA:	100%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,137.84	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	161.46	
Sub Total	0.00	9,829.07	161.46	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	69.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,829.07</b>	<b>230.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS****BLDG: 0820****BUILDING NAME: TAC EQUIP SHOP**

Building UA:	8,561	CONDITIONED SQFT:	20,564
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	3,100
CFM-CLG:	0
%OA:	100%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,137.84	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	161.46	
Sub Total	0.00	9,829.07	161.46	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	69.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,829.07</b>	<b>230.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM

**ENERGY CALCULATION PARAMETERS**

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

Building UA: 8,561

CONDITIONED SQFT: 20,564

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	7	9	7	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	3,100
CFM-CLG:	0
%OA:	100%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	840	3,360
HTG HRS ON:	1,344	5,376
H/C HRS ON:	2,190	8,760
CLG HRS SAVED:	2,520	
HTG HRS SAVED:	4,032	
C/H HRS SAVED:	6,570	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM

BLDG: 0820

BUILDING NAME: TAC EQUIP SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,137.84	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	161.46	
<b>Sub Total</b>	<b>0.00</b>	<b>9,829.07</b>	<b>161.46</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	69.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,829.07</b>	<b>230.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 833  
AIRCRAFT HANGAR**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0833****BUILDING NAME: AIRCRAFT HANGAR**

Building UA:	10,102	CONDITIONED SQFT:	52,080
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	1,800
%OA:	15%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,947.63	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.52	0.00	0.00	
Night Setback	0.00	10,129.32	0.00	
Sub Total	0.52	12,283.79	0.00	
Economizer	0.00	415.80	0.00	
Ventilation/Recirculation	0.00	56.00	0.00	
DDC Control	0.00	1,219.68	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.52</b>	<b>13,975.27</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0833****BUILDING NAME: AIRCRAFT HANGAR**

Building UA:	10,102	CONDITIONED SQFT:	52,080
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	1,550
%OA:	15%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,890.00	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.52	0.00	0.00	
Night Setback	0.00	8,722.47	0.00	
Sub Total	0.52	10,819.31	0.00	
Economizer	0.00	358.05	0.00	
Ventilation/Recirculation	0.00	48.22	0.00	
DDC Control	0.00	1,050.28	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.52</b>	<b>12,275.86</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

Building UA:	10,102	CONDITIONED SQFT:	52,080
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.73
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	4,000,000
BLR CAP OUTPUT (BTUH):	3,320,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,821.63	0.00	
Opt ST/SP	0.00	1,250.16	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	16,071.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	22.68	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>16,071.79</b>	<b>22.68</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

## ENERGY CALCULATION PARAMETERS

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

Building UA:	10,102	CONDITIONED SQFT:	52,080
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### SYSTEM INFORMATION

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

### INPUTS

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	6
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

### CONSTANTS

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	105.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	5.05	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>5.05</b>	<b>105.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 0833****BUILDING NAME: AIRCRAFT HANGAR**

Building UA:	10,102	CONDITIONED SQFT:	52,080
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0833 BUILDING NAME: AIRCRAFT HANGAR  
Building UA: 10,102 CONDITIONED SQFT: 52,080

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,475
CFM-CLG:	0
%OA:	100%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,223.22	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	142.89	
Sub Total	0.00	14,338.56	142.89	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	61.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,338.56</b>	<b>204.41</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0833 BUILDING NAME: AIRCRAFT HANGAR  
Building UA: 10,102 CONDITIONED SQFT: 52,080

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,485
CFM-CLG:	0
%OA:	100%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**BLDG: 0833****BUILDING NAME: AIRCRAFT HANGAR****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: H&V-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,195.05	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	142.89	
Sub Total	0.00	8,886.28	142.89	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	61.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,886.28</b>	<b>204.41</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0833 BUILDING NAME: AIRCRAFT HANGAR  
Building UA: 10,102 CONDITIONED SQFT: 52,080

**SYSTEM INFORMATION**

System Type: 26  
System Name: Pump  
System Number: HWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,223.22	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	14,338.56	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,338.56</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

Building UA: 10,102

CONDITIONED SQFT: 52,080

**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.39
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	70%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AMS/AJN

BLDG: 0833

BUILDING NAME: AIRCRAFT HANGAR

**ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,066.67	0.00	
Opt ST/SP	0.00	933.44	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	12,000.12	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>12,000.12</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 835**  
**MAF OPS BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0835

BUILDING NAME: MAF OPS BLDG

Building UA: 4,060

CONDITIONED SQFT: 19,470

**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	18,500
CFM-CLG:	18,500
%OA:	10%
%Area:	67%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0835

BUILDING NAME: MAF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,538.16	176.59	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	102,573.37	99.56	
<b>Sub Total</b>	<b>10.99</b>	<b>138,754.34</b>	<b>276.15</b>	
Economizer	0.00	4,217.90	0.00	
Ventilation/Recirculation	0.00	145.01	9.14	
DDC Control	0.00	12,361.90	81.88	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>155,479.16</b>	<b>367.17</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0835 BUILDING NAME: MAF OPS BLDG  
Building UA: 4,060 CONDITIONED SQFT: 19,470

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0835

BUILDING NAME: MAF OPS BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.04</b>	<b>437.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS****BLDG: 0835****BUILDING NAME: MAF OPS BLDG**

Building UA:	4,060	CONDITIONED SQFT:	19,470
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**BLDG: 0835****BUILDING NAME: MAF OPS BLDG****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,748.77	0.00	
Opt ST/SP	0.00	737.94	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,486.70	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,486.70</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>



**BUILDING 840**  
**VEHICLE MAINTENANCE SHOP ORG**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

Building UA:	3,810	CONDITIONED SQFT:	9,152
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	1,460
CFM-CLG:	1,460
%OA:	15%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY:

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,119.66	22.75	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	8,811.35	27.89	
<b>Sub Total</b>	<b>2.47</b>	<b>17,299.98</b>	<b>50.64</b>	
Economizer	0.00	272.35	0.00	
Ventilation/Recirculation	0.00	17.17	1.08	
DDC Control	0.00	798.21	22.94	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>18,387.70</b>	<b>74.66</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

Building UA:	3,810	CONDITIONED SQFT:	9,152
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	600,000
BLR CAP OUTPUT (BTUH):	480,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,761.50	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,130.46	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.40	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,130.46</b>	<b>3.40</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

Building UA: 3,810

CONDITIONED SQFT: 9,152

**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	6
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	105.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	5.05	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>5.05</b>	<b>105.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS****BLDG: 0840****BUILDING NAME: VEHICLE MNT SHOP ORG**

Building UA:	3,810	CONDITIONED SQFT:	9,152
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	14/METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	2,370
CFM-CLG:	2,370
%OA:	58%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**BLDG: 0840****BUILDING NAME: VEHICLE MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,920.27	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,611.50	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	123.44	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,611.50</b>	<b>123.44</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS****BLDG: 0840****BUILDING NAME: VEHICLE MNT SHOP ORG**

Building UA:	3,810	CONDITIONED SQFT:	9,152
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	3,500
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY:

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,920.27	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	17.96	
Sub Total	0.00	9,611.50	17.96	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	7.73	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,611.50</b>	<b>25.70</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

Building UA:	3,810	CONDITIONED SQFT:	9,152
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**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	25%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY:

BLDG: 0840

BUILDING NAME: VEHICLE MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,192.57	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	89.82	
Sub Total	0.00	1,284.98	89.82	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,284.98</b>	<b>89.82</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 853**  
**MAINTENANCE HANGAR AVUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,332 CONDITIONED SQFT: 48,112

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F; SAT

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,000
CFM-CLG:	3,000
%OA:	20%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,539.88	60.82	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	17,663.91	17.08	
Sub Total	3.12	28,670.53	77.90	
Economizer	0.00	596.93	0.00	
Ventilation/Recirculation	0.00	47.03	2.96	
DDC Control	0.00	1,749.50	14.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>31,063.99</b>	<b>94.91</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	2,700
CFM-CLG:	2,700
%OA:	20%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,443.40	54.74	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	15,897.52	17.08	
Sub Total	3.12	26,807.65	71.82	
Economizer	0.00	537.24	0.00	
Ventilation/Recirculation	0.00	42.33	2.67	
DDC Control	0.00	1,574.55	14.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>28,961.76</b>	<b>88.53</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM**

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,000
CFM-CLG:	3,000
%OA:	20%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,539.88	60.82	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	17,663.91	17.08	
Sub Total	3.12	28,670.53	77.90	
Economizer	0.00	596.93	0.00	
Ventilation/Recirculation	0.00	47.03	2.96	
DDC Control	0.00	1,749.50	14.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>31,063.99</b>	<b>94.91</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.41
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	70%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,609,000
BLR CAP OUTPUT (BTUH):	2,887,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	28,084.36	0.00	
Opt ST/SP	0.00	2,230.66	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	30,315.02	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	20.46	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>30,315.02</b>	<b>20.46</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,332 CONDITIONED SQFT: 48,112

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F, SAT  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853 BUILDING NAME: MNT HANGAR AVUM  
 Building UA: 9,332 CONDITIONED SQFT: 48,112

**SYSTEM INFORMATION**

System Type: 8  
 System Name: Air cooled DX compressor  
 System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
 7 BRICK AND CMU BATTALION 0700-1800 M-F, SAT

Weeks of Winter: 32  
 Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,332 CONDITIONED SQFT: 48,112

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-3

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F, SAT  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	5,000
CFM-CLG:	0
%OA:	30%
%Area:	7%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	150.34	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	23.91	
Sub Total	0.00	9,393.93	174.24	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	11.94	
DDC Control	0.00	0.00	19.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>205.85</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM**

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	6,100
CFM-CLG:	0
%OA:	25%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	152.84	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	27.32	
Sub Total	0.00	9,393.93	180.17	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	12.14	
DDC Control	0.00	0.00	22.47	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>214.78</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	14METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,000
CFM-CLG:	0
%OA:	100%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,393.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	90.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>90.71</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853 BUILDING NAME: MNT HANGAR AVUM  
Building UA: 9,332 CONDITIONED SQFT: 48,112

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: MAU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
14 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,000
CFM-CLG:	0
%OA:	100%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: MAU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,393.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	90.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>90.71</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM**

<b>Building UA:</b>	9,332	<b>CONDITIONED SQFT:</b>	48,112
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**SYSTEM INFORMATION**

<b>System Type:</b>	16
<b>System Name:</b>	Heating and Ventilating Unit
<b>System Number:</b>	MAU-3

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	15	17	0

**INPUTS**

<b>Motor HP:</b>	3.00
<b>HP Effic:</b>	0.79
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	7,000
<b>CFM-CLG:</b>	0
<b>%OA:</b>	100%
<b>%Area:</b>	15%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000199
<b>DDCCC:</b>	0.0000526
<b>NSC:</b>	0
<b>DDCH:</b>	64800
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	960	3,360
<b>HTG HRS ON:</b>	1,536	5,376
<b>H/C HRS ON:</b>	2,503	8,760
<b>CLG HRS SAVED:</b>	2,400	
<b>HTG HRS SAVED:</b>	3,840	
<b>C/H HRS SAVED:</b>	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: MAU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,393.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	90.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>90.71</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	14 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,000
CFM-CLG:	0
%OA:	100%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: MAU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,702.70	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,393.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	90.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,393.93</b>	<b>90.71</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 0853

BUILDING NAME: MNT HANGAR AVUM

Building UA:	9,332	CONDITIONED SQFT:	48,112
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.40
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	70%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 0853****BUILDING NAME: MNT HANGAR AVUM****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	17,405.19	0.00	
Opt ST/SP	0.00	1,382.44	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	18,787.63	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>18,787.63</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 1470**  
**AR VEHICLE MAINTENANCE SHOP**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP****Building UA:** 9,020**CONDITIONED SQFT:** 21,667**SYSTEM INFORMATION****System Type:** 8**System Name:** Air cooled DX compressor**System Number:** ACCU-1**TYPICAL BUILDING INFORMATION**

<b>Catagory Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	7BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

**Weeks of Winter:** 32**Weeks of Summer:** 20**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	16	16	16	16	16	0

**INPUTS**

<b>Motor HP:</b>	0.00
<b>HP Effic:</b>	0.64
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	5
<b>KW-TON:</b>	1.10
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	16.2
<b>HOAUH:</b>	26.1
<b>COAUHC:</b>	0.000257
<b>COAUC:</b>	0.00068
<b>HOAOHC:</b>	33.3
<b>HOAOH:</b>	53.5
<b>COAOHC:</b>	0.00115
<b>COAOC:</b>	0.00305
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00021
<b>ECHC:</b>	0.0000795
<b>NSUCHC:</b>	0.000941
<b>NSUCC:</b>	0.00249
<b>DDCCHC:</b>	0.000233
<b>DDCCC:</b>	0.000616
<b>NSC:</b>	36600
<b>DDCH:</b>	30100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	900	3,360
<b>HTG HRS ON:</b>	1,440	5,376
<b>H/C HRS ON:</b>	2,346	8,760
<b>CLG HRS SAVED:</b>	2,460	
<b>HTG HRS SAVED:</b>	3,936	
<b>C/H HRS SAVED:</b>	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP**

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,500
CFM-CLG:	2,500
%OA:	25%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,973.43	64.94	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.62	0.00	0.00	
Night Setback	0.00	15,087.93	26.41	
Sub Total	0.62	18,153.77	91.35	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,366.79	21.72	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.62</b>	<b>19,520.57</b>	<b>113.07</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

Building UA: 9,020

CONDITIONED SQFT: 21,667

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	2,000
%OA:	20%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,602.57	41.56	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.62	0.00	0.00	
Night Setback	0.00	12,070.34	13.21	
Sub Total	0.62	14,765.32	54.77	
Economizer	0.00	373.08	0.00	
Ventilation/Recirculation	0.00	31.35	1.98	
DDC Control	0.00	1,093.44	10.86	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.62</b>	<b>16,263.19</b>	<b>67.60</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP**

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	990,000
BLR CAP OUTPUT (BTUH):	792,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DCCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,023.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,489.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.61	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,489.82</b>	<b>5.61</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	990,000
BLR CAP OUTPUT (BTUH):	792,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,023.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,489.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.61	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,489.82</b>	<b>5.61</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP**

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	20.00
HP Effic:	0.88
Load Factor:	0.80
CFM-HTG:	22,200
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	53,325.88	0.00	
Opt ST/SP	0.00	4,132.21	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	42.53	
Sub Total	0.00	57,458.09	42.53	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>57,458.09</b>	<b>60.84</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 1470

BUILDING NAME: AR VEH MNT SHOP

Building UA:	9,020	CONDITIONED SQFT:	21,667
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	12,320
CFM-CLG:	0
%OA:	0%
%Area:	55%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP****ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,761.50	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	467.82	
Sub Total	0.00	5,130.46	467.82	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,130.46</b>	<b>467.82</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 1470 BUILDING NAME: AR VEH MNT SHOP  
Building UA: 9,020 CONDITIONED SQFT: 21,667

**SYSTEM INFORMATION**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	4,800
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 1470****BUILDING NAME: AR VEH MNT SHOP****ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,779.55	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	170.12	
Sub Total	0.00	1,917.45	170.12	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,917.45</b>	<b>170.12</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 4010  
DENTAL CLINIC**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 4010****BUILDING NAME: DENTAL CLINIC**

Building UA:	2,715	CONDITIONED SQFT:	15,587
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**SYSTEM INFORMATION**

System Type:	18
System Name:	Dual Duct air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10 BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	35.00
HP Effic:	0.90
Load Factor:	0.80
CFM-HTG:	17,560
CFM-CLG:	17,560
%OA:	40%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUHC:	0.000143
NSUC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 4010

BUILDING NAME: DENTAL CLINIC

**ENERGY CALCULATION SUMMARY**

System Type: 18  
 System Name: Dual Duct air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	194,777.72	2,169.53	
Opt ST/SP	0.00	7,063.02	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	15,450.32	97.74	
Sub Total	0.00	217,291.06	2,267.27	
Economizer	0.00	14,283.81	0.00	
Ventilation/Recirculation	0.00	2,592.21	107.54	
DDC Control	0.00	5,447.99	109.41	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>239,615.06</b>	<b>2,484.23</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
28	Direct digital control - Dual Duct AHU	1	7	0	9	\$3,761.00
34	Outside air damper ventilation and recirculation control - Dual Duct AHU	0	1	0	0	\$272.00
37	Outside air damper economizer control - Dual Duct AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>3</b>	<b>8</b>	<b>1</b>	<b>13</b>	<b>\$5,241.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 4010****BUILDING NAME: DENTAL CLINIC**

Building UA:	2,715	CONDITIONED SQFT:	15,587
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,750,000
BLR CAP OUTPUT (BTUH):	1,400,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 4010****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,428.27	0.00	
Opt ST/SP	0.00	276.91	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,705.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	9.92	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,705.18</b>	<b>9.92</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 4010****BUILDING NAME: DENTAL CLINIC**

Building UA:	2,715	CONDITIONED SQFT:	15,587
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	80
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 4010****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,630.20	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	9,745.54	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,400.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	67.32	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>70.12</b>	<b>11,145.54</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 4010****BUILDING NAME: DENTAL CLINIC**

<b>Building UA:</b>	<b>2,715</b>	<b>CONDITIONED SQFT:</b>	<b>15,587</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>26</b>
<b>System Name:</b>	<b>Pump</b>
<b>System Number:</b>	<b>HWP-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>10</b>	<b>BRICK AND CMU</b>	<b>DENTAL CLINIC</b>	<b>0800-1700</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>0</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>0</b>
<b>REQ STOP:</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>0</b>

**INPUTS**

<b>Motor HP:</b>	<b>1.00</b>
<b>HP Effic:</b>	<b>0.69</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,000</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,600</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,607</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,360</b>	
<b>HTG HRS SAVED:</b>	<b>3,776</b>	
<b>C/H HRS SAVED:</b>	<b>6,153</b>	

**CONSTANTS**

<b>HOAUHC:</b>	<b>50.2</b>
<b>HOAUH:</b>	<b>80.7</b>
<b>COAUHC:</b>	<b>0.00121</b>
<b>COAUC:</b>	<b>0.0032</b>
<b>HOAOHC:</b>	<b>45.3</b>
<b>HOAOH:</b>	<b>72.8</b>
<b>COAOHC:</b>	<b>0.0017</b>
<b>COAOC:</b>	<b>0.0045</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.000826</b>
<b>ECHC:</b>	<b>0.000312</b>
<b>NSUCHC:</b>	<b>0.000143</b>
<b>NSUCC:</b>	<b>0.000379</b>
<b>DCCCHC:</b>	<b>0.000119</b>
<b>DDCCC:</b>	<b>0.000316</b>
<b>NSC:</b>	<b>36000</b>
<b>DDCH:</b>	<b>40300</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 4010****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,519.57	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 4010****BUILDING NAME: DENTAL CLINIC**

Building UA:	2,715	CONDITIONED SQFT:	15,587
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	10/BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 4010

BUILDING NAME: DENTAL CLINIC

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,519.57	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 4010

BUILDING NAME: DENTAL CLINIC

Building UA:	2,715	CONDITIONED SQFT:	15,587
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 4010****BUILDING NAME: DENTAL CLINIC****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,466.95	0.00	
Opt ST/SP	0.00	280.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,746.99	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,746.99</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 5000  
FIRE STATION**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 5000****BUILDING NAME: FIRE STATION**

Building UA:	2,186	CONDITIONED SQFT:	8,400
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	1 PANEL & METAL BEAM	FIRE STATION	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	4,155
CFM-CLG:	4,155
%OA:	20%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.000137
DDCCC:	0.000362
NSC:	36400
DDCH:	84900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN

BLDG: 5000

BUILDING NAME: FIRE STATION

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	47.74	
Sub Total	0.00	0.00	47.74	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	4,986.50	111.35	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,986.50</b>	<b>159.10</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 5000 BUILDING NAME: FIRE STATION  
Building UA: 2,186 CONDITIONED SQFT: 8,400

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	1 PANEL & METAL BEAM	FIRE STATION	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,840
CFM-CLG:	0
%OA:	100%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.000137
DDCCC:	0.000362
NSC:	36400
DDCH:	84900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 5000

BUILDING NAME: FIRE STATION

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	31.83	
Sub Total	0.00	0.00	31.83	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	74.24	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>106.06</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 5000

BUILDING NAME: FIRE STATION

Building UA:	2,186	CONDITIONED SQFT:	8,400
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	1 PANEL & METAL BEAM	FIRE STATION	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.17
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	750,000
BLR CAP OUTPUT (BTUH):	600,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.000137
DDCCC:	0.000362
NSC:	36400
DDCH:	84900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 5000

BUILDING NAME: FIRE STATION

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.25	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>4.25</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 5000****BUILDING NAME: FIRE STATION**

Building UA: 2,186

CONDITIONED SQFT: 8,400

**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
1	PANEL & METAL BEAM	FIRE STATION	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.000137
DDCCC:	0.000362
NSC:	36400
DDCH:	84900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 5000

BUILDING NAME: FIRE STATION

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	175.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	8.42	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>8.42</b>	<b>175.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 5302  
POST OFFICE**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5302 BUILDING NAME: POST OFFICE  
 Building UA: 2,645 CONDITIONED SQFT: 12,240

**SYSTEM INFORMATION**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	12,660
CFM-CLG:	12,660
%OA:	20%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5302

BUILDING NAME: POST OFFICE

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	38,718.77	263.07	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	76,405.26	48.40	
Sub Total	0.00	116,766.84	311.48	
Economizer	0.00	2,361.61	0.00	
Ventilation/Recirculation	0.00	198.47	12.51	
DDC Control	0.00	6,921.45	39.81	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>126,248.37</b>	<b>363.80</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5302****BUILDING NAME: POST OFFICE**

Building UA:	2,645	CONDITIONED SQFT:	12,240
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	608,400
BLR CAP OUTPUT (BTUH):	507,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAHC:	33.3
HOAOH:	53.5
COAHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 5302

BUILDING NAME: POST OFFICE

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,394.52	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,657.56	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.45	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,657.56</b>	<b>3.45</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5302****BUILDING NAME: POST OFFICE**

Building UA:	2,645	CONDITIONED SQFT:	12,240
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	54
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 5302

BUILDING NAME: POST OFFICE

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	945.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	45.44	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>45.44</b>	<b>945.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5302

BUILDING NAME: POST OFFICE

Building UA: 2,645

CONDITIONED SQFT: 12,240

**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	10	8	8	10
REQ STOP:	0	17	17	17	17	17	12

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 5302****BUILDING NAME: POST OFFICE****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,394.52	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,657.56	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,657.56</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 5309**  
**GUEST HOUSE**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5309****BUILDING NAME: GUEST HOUSE**

Building UA:	6,555	CONDITIONED SQFT:	23,784
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.72
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,255,000
BLR CAP OUTPUT (BTUH):	1,004,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5309

BUILDING NAME: GUEST HOUSE

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	7.12	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.12</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 13-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5309****BUILDING NAME: GUEST HOUSE**

Building UA:	6,555	CONDITIONED SQFT:	23,784
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System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
5	BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	315,000
BLR CAP OUTPUT (BTUH):	245,700

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 13-Dec-95  
 PREPARED BY: AJN/CWW

BLDG: 5309

BUILDING NAME: GUEST HOUSE

## ENERGY CALCULATION SUMMARY

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
TOTAL	0.00	0.00	0.00	4.00

## TYPICAL SYSTEM POINT AND COST SUMMARY

UMCS APPLICATION	POINTS	NO. OF POINTS	NO. OF POINTS	NO. OF POINTS	COST
7 Steam Boiler Monitoring	1	0	3	1	\$1,015.00
TOTAL	1	0	3	1	\$1,015.00

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5309****BUILDING NAME: GUEST HOUSE**

Building UA:	6,555	CONDITIONED SQFT:	23,784
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	50
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5309

BUILDING NAME: GUEST HOUSE

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	875.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	42.08	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>44.87</b>	<b>875.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5309****BUILDING NAME: GUEST HOUSE**

<b>Building UA:</b>	6,555	<b>CONDITIONED SQFT:</b>	23,784
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**SYSTEM INFORMATION**

<b>System Type:</b>	26
<b>System Name:</b>	Pump
<b>System Number:</b>	HWP-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	3.00
<b>HP Effic:</b>	0.79
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000556
<b>DDCCC:</b>	0.000147
<b>NSC:</b>	20000
<b>DDCH:</b>	33900
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 5309****BUILDING NAME: GUEST HOUSE****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 5315  
MORRIS HILL CHAPEL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL**

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	13,500
CFM-CLG:	13,500
%OA:	20%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,969.21	201.04	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	12,086.45	264.59	
Sub Total	14.19	49,177.16	465.63	
Economizer	0.00	7,069.55	0.00	
Ventilation/Recirculation	0.00	284.93	13.83	
DDC Control	0.00	34,237.68	144.49	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>14.19</b>	<b>90,769.32</b>	<b>623.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL****Building UA:** 6,485**CONDITIONED SQFT:** 19,748**SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
8	BRICK AND CMU	CHURCH	0700-1800	SAT-SUN

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	9	7	7	7	7	7	10
<b>REQ STOP:</b>	13	21	21	21	21	21	19

**INPUTS**

<b>Motor HP:</b>	7.25
<b>HP Effic:</b>	0.74
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	1,743,000
<b>BLR CAP OUTPUT (BTUH):</b>	1,516,000

**CONSTANTS**

<b>HOAUHC:</b>	16.8
<b>HOAUH:</b>	27
<b>COAUHC:</b>	0.000346
<b>COAUC:</b>	0.000915
<b>HOAOHC:</b>	71.1
<b>HOAOH:</b>	114
<b>COAOHC:</b>	0.00247
<b>COAOC:</b>	0.00652
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00032
<b>ECHC:</b>	0.000121
<b>NSUCHC:</b>	0.000202
<b>NSUCC:</b>	0.000533
<b>DDCCHC:</b>	0.000586
<b>DDCCC:</b>	0.00155
<b>NSC:</b>	102000
<b>DDCH:</b>	55700
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,660	3,360
<b>HTG HRS ON:</b>	2,656	5,376
<b>H/C HRS ON:</b>	4,328	8,760
<b>CLG HRS SAVED:</b>	1,700	
<b>HTG HRS SAVED:</b>	2,720	
<b>C/H HRS SAVED:</b>	4,432	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	15,932.62	0.00	
Opt ST/SP	0.00	1,786.56	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	17,719.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	9.88	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>17,719.18</b>	<b>9.88</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5315	BUILDING NAME: MORRIS HILL CHAPEL
Building UA: 6,485	CONDITIONED SQFT: 19,748

**SYSTEM INFORMATION**

System Type: 6
System Name: Small air cooled chiller
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8BRICK AND CMU	CHURCH	0700-1800	SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	61
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,216.67	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	7,332.01	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,067.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	51.33	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>54.13</b>	<b>8,399.51</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL**

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	61
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,216.67	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	7,332.01	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,067.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	51.33	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>54.13</b>	<b>8,399.51</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL****Building UA:** 6,485**CONDITIONED SQFT:** 19,748**SYSTEM INFORMATION**

<b>System Type:</b>	6
<b>System Name:</b>	Small air cooled chiller
<b>System Number:</b>	CH-3

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	8BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	9	7	7	7	7	7	10
<b>REQ STOP:</b>	13	21	21	21	21	21	19

**INPUTS**

<b>Motor HP:</b>	1.50
<b>HP Effic:</b>	0.74
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	11
<b>KW-TON:</b>	1.10
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	16.8
<b>HOAUH:</b>	27
<b>COAUHC:</b>	0.000346
<b>COAUC:</b>	0.000915
<b>HOAOHC:</b>	71.1
<b>HOAOH:</b>	114
<b>COAOHC:</b>	0.00247
<b>COAOC:</b>	0.00652
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00032
<b>ECHC:</b>	0.000121
<b>NSUCHC:</b>	0.000202
<b>NSUCC:</b>	0.000533
<b>DDCCHC:</b>	0.000586
<b>DDCCC:</b>	0.00155
<b>NSC:</b>	102000
<b>DDCH:</b>	55700
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,660	3,360
<b>HTG HRS ON:</b>	2,656	5,376
<b>H/C HRS ON:</b>	4,328	8,760
<b>CLG HRS SAVED:</b>	1,700	
<b>HTG HRS SAVED:</b>	2,720	
<b>C/H HRS SAVED:</b>	4,432	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-3

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,056.54	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.93	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.93	2,425.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	183.75	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	8.84	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>9.76</b>	<b>2,609.26</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL**

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	7,200
%OA:	15%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL****ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,822.40	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	5,616.41	14.14	
Sub Total	0.00	9,701.85	14.14	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,701.85</b>	<b>14.14</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	8,000
CFM-CLG:	8,000
%OA:	15%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,822.40	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	6,240.46	16.96	
Sub Total	0.00	10,325.90	16.96	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>10,325.90</b>	<b>16.96</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	3,500
CFM-COLG:	3,500
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 5315****BUILDING NAME: MORRIS HILL CHAPEL****ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,822.40	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,730.20	11.31	
Sub Total	0.00	6,815.64	11.31	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,815.64</b>	<b>11.31</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,290.46	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,659.43	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,659.43</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

Building UA:	6,485	CONDITIONED SQFT:	19,748
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 5315

BUILDING NAME: MORRIS HILL CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,844.65	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,051.50	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,051.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 5800  
YOUTH CENTER**

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

## ENERGY CALCULATION PARAMETERS

BLDG: 5800

BUILDING NAME: YOUTH CTR

Building UA: 2,572

CONDITIONED SQFT: 21,560

### SYSTEM INFORMATION

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

### INPUTS

Motor HP:	15.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	12,300
CFM-CLG:	12,300
%OA:	10%
%Area:	60%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### CONSTANTS

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	57,965.19	140.75	
Opt ST/SP	0.00	3,149.20	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	21.06	0.00	0.00	
Night Setback	0.00	42,897.17	655.86	
Sub Total	21.06	104,011.57	796.61	
Economizer	0.00	335.37	0.00	
Ventilation/Recirculation	0.00	79.91	7.84	
DDC Control	0.00	577.80	16.98	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>21.06</b>	<b>105,004.64</b>	<b>821.42</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5800 BUILDING NAME: YOUTH CTR  
Building UA: 2,572 CONDITIONED SQFT: 21,560

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
16BRICK AND CMU GYMNASIUM 0600-2200 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	8,020
CFM-CLG:	8,020
%OA:	15%
%Area:	40%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	30,892.80	137.66	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	27,970.35	437.24	
Sub Total	10.99	60,505.97	574.90	
Economizer	0.00	218.67	0.00	
Ventilation/Recirculation	0.00	78.15	7.67	
DDC Control	0.00	376.74	11.32	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>10.99</b>	<b>61,179.53</b>	<b>593.88</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5800 BUILDING NAME: YOUTH CTR  
 Building UA: 2,572 CONDITIONED SQFT: 21,560

**SYSTEM INFORMATION**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	2.17
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	600,000
BLR CAP OUTPUT (BTUH):	480,000

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,128.72	0.00	
Opt ST/SP	0.00	556.33	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,685.04	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.40	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,685.04</b>	<b>3.40</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5800****BUILDING NAME: YOUTH CTR**

Building UA:	2,572	CONDITIONED SQFT:	21,560
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	0.17
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	600,000
BLR CAP OUTPUT (BTUH):	480,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	532.64	0.00	
Opt ST/SP	0.00	48.35	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	580.99	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.40	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>580.99</b>	<b>3.40</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5800

BUILDING NAME: YOUTH CTR

Building UA: 2,572

CONDITIONED SQFT: 21,560

**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	54
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type: 6  
 System Name: Small air cooled chiller  
 System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,759.29	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	5,450.52	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	939.75	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	45.19	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>46.92</b>	<b>6,390.27</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 5800

BUILDING NAME: YOUTH CTR

Building UA:	2,572	CONDITIONED SQFT:	21,560
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	16 BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 5800****BUILDING NAME: YOUTH CTR****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,141.66	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,608.39	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,608.39</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 5800****BUILDING NAME: YOUTH CTR**

Building UA:	2,572	CONDITIONED SQFT:	21,560
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	16 BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	5	5	5	8	8
REQ STOP:	0	22	19	19	19	2	19

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 5800

BUILDING NAME: YOUTH CTR

**ENERGY CALCULATION SUMMARY**

System Type: 26

System Name: Pump

System Number: HWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,141.66	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,608.39	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,608.39</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 6620**  
**COMMUNICATION ACT CENTER**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6620****BUILDING NAME: COMMUN ACT CTR****Building UA: 4,433****CONDITIONED SQFT: 31,740****SYSTEM INFORMATION**

<b>System Type:</b>	10
<b>System Name:</b>	Multizone air handling unit
<b>System Number:</b>	AHU-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
21	BRICK AND CMU	TRAINING	0700-2100	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

<b>Motor HP:</b>	7.50
<b>HP Effic:</b>	0.83
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	12,910
<b>CFM-CLG:</b>	12,910
<b>%OA:</b>	10%
<b>%Area:</b>	32%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	21.1
<b>HOAUH:</b>	34
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	17.3
<b>HOAOH:</b>	27.9
<b>COAOHC:</b>	0.000885
<b>COAOC:</b>	0.00234
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000207
<b>ECHC:</b>	0.0000784
<b>NSUCHC:</b>	0.000221
<b>NSUCC:</b>	0.000584
<b>DDCCHC:</b>	0.0000919
<b>DDCCC:</b>	0.000243
<b>NSC:</b>	30500
<b>DDCH:</b>	31900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	900	3,360
<b>HTG HRS ON:</b>	1,440	5,376
<b>H/C HRS ON:</b>	2,346	8,760
<b>CLG HRS SAVED:</b>	2,460	
<b>HTG HRS SAVED:</b>	3,936	
<b>C/H HRS SAVED:</b>	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,545.30	174.71	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	18,298.62	43.27	
Sub Total	10.99	54,486.74	217.97	
Economizer	0.00	2,374.92	0.00	
Ventilation/Recirculation	0.00	0.00	8.31	
DDC Control	0.00	2,783.87	45.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>59,645.54</b>	<b>271.53</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620 BUILDING NAME: COMMUN ACT CTR  
Building UA: 4,433 CONDITIONED SQFT: 31,740

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
21 BRICK AND CMU TRAINING 0700-2100 M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	9,600
CFM-CLG:	9,600
%OA:	30%
%Area:	23%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,545.30	389.74	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	13,607.03	31.10	
Sub Total	10.99	49,795.15	420.84	
Economizer	0.00	1,766.02	0.00	
Ventilation/Recirculation	0.00	0.00	18.53	
DDC Control	0.00	2,070.11	32.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>10.99</b>	<b>53,631.28</b>	<b>471.90</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

Building UA: 4,433

CONDITIONED SQFT: 31,740

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	10,500
CFM-CLG:	0
%OA:	100%
%Area:	14%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,393.41	1,405.15	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	18.93	
Sub Total	0.00	15,508.75	1,424.08	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	19.80	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,508.75</b>	<b>1,443.88</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620 BUILDING NAME: COMMUN ACT CTR  
Building UA: 4,433 CONDITIONED SQFT: 31,740

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	8,800
CFM-CLG:	8,800
%OA:	34%
%Area:	23%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	23,453.55	404.90	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	12,473.11	31.10	
Sub Total	7.46	37,042.01	435.99	
Economizer	0.00	1,618.85	0.00	
Ventilation/Recirculation	0.00	0.00	19.26	
DDC Control	0.00	1,897.60	32.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>40,558.46</b>	<b>487.77</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

Building UA:	4,433	CONDITIONED SQFT:	31,740
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	5,736,000
BLR CAP OUTPUT (BTUH):	4,520,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

Building UA: 4,433

CONDITIONED SQFT: 31,740

**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	130
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,970.71	0.00	
Opt ST/SP	0.00	1,856.13	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.66	16,826.84	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	2,275.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	109.40	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>114.05</b>	<b>19,101.84</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6620****BUILDING NAME: COMMUN ACT CTR**

Building UA:	4,433	CONDITIONED SQFT:	31,740
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.70
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	4,520,000
BLR CAP OUTPUT (BTUH):	4,520,000

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6620****BUILDING NAME: COMMUN ACT CTR****ENERGY CALCULATION SUMMARY**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,711.44	0.00	
Opt ST/SP	0.00	520.07	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	7,231.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	25.63	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>7,231.51</b>	<b>25.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

Building UA: 4,433

CONDITIONED SQFT: 31,740

**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,250.25	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	14,893.07	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.12</b>	<b>14,893.07</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

Building UA:	4,433	CONDITIONED SQFT:	31,740
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21/BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 6620

BUILDING NAME: COMMUN ACT CTR

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,779.55	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,917.45	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,917.45</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 6910  
EXC SP ST FACILITY**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6910 BUILDING NAME: EXC SP ST FAC  
Building UA: 789 CONDITIONED SQFT: 2,525

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number: 17 Construction: BRICK AND CMU Use: RETAIL SHOP Occupancy HRS: 0800-2200 Occupancy Days: M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	11	11	11	11	11	10
REQ STOP:	0	22	22	22	22	22	22

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,360
CFM-CLG:	1,360
%OA:	15%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,340	3,360
HTG HRS ON:	2,144	5,376
H/C HRS ON:	3,494	8,760
CLG HRS SAVED:	2,020	
HTG HRS SAVED:	3,232	
C/H HRS SAVED:	5,266	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6910****BUILDING NAME: EXC SP ST FAC****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,631.39	18.69	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	3,258.87	156.62	
Sub Total	0.00	6,028.15	175.31	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,178.31	81.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>7,206.46</b>	<b>256.97</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6910****BUILDING NAME: EXC SP ST FAC**

Building UA:	789	CONDITIONED SQFT:	2,525
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	11	11	11	11	11	10
REQ STOP:	0	22	22	22	22	22	22

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,360
CFM-CLG:	1,360
%OA:	15%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,340	3,360
HTG HRS ON:	2,144	5,376
H/C HRS ON:	3,494	8,760
CLG HRS SAVED:	2,020	
HTG HRS SAVED:	3,232	
C/H HRS SAVED:	5,266	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**BLDG: 6910****BUILDING NAME: EXC SP ST FAC****ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,631.39	18.69	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	3,258.87	156.62	
Sub Total	0.00	6,028.15	175.31	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,178.31	81.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>7,206.46</b>	<b>256.97</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6910

BUILDING NAME: EXC SP ST FAC

Building UA:	789	CONDITIONED SQFT:	2,525
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	11	11	11	11	11	10
REQ STOP:	0	22	22	22	22	22	22

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,340	3,360
HTG HRS ON:	2,144	5,376
H/C HRS ON:	3,494	8,760
CLG HRS SAVED:	2,020	
HTG HRS SAVED:	3,232	
C/H HRS SAVED:	5,266	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 6910

BUILDING NAME: EXC SP ST FAC

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6910****BUILDING NAME: EXC SP ST FAC**

Building UA:	789	CONDITIONED SQFT:	2,525
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	11	11	11	11	11	10
REQ STOP:	0	22	22	22	22	22	22

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,340	3,360
HTG HRS ON:	2,144	5,376
H/C HRS ON:	3,494	8,760
CLG HRS SAVED:	2,020	
HTG HRS SAVED:	3,232	
C/H HRS SAVED:	5,266	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6910****BUILDING NAME: EXC SP ST FAC****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**BUILDING 6914  
EXC MAIN RETL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6914****BUILDING NAME: EXC MAIN RETL**

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	20.00
HP Effic:	0.88
Load Factor:	0.80
CFM-HTG:	28,100
CFM-CLG:	28,100
%OA:	57%
%Area:	51%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	78,390.40	1,264.28	
Opt ST/SP	0.00	4,132.21	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	58,000.51	3,717.15	
Sub Total	0.00	140,523.12	4,981.43	
Economizer	0.00	35,604.71	0.00	
Ventilation/Recirculation	0.00	1,138.25	85.00	
DDC Control	0.00	29,433.22	1,938.16	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>206,699.30</b>	<b>7,004.59</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6914****BUILDING NAME: EXC MAIN RETL**

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	17 BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	3,500
CFM-CLG:	3,500
%OA:	17%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,570.81	46.97	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	7,224.26	437.31	
Sub Total	0.00	15,261.80	484.28	
Economizer	0.00	4,434.75	0.00	
Ventilation/Recirculation	0.00	42.28	3.16	
DDC Control	0.00	3,666.06	228.02	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>23,404.89</b>	<b>715.45</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	17 BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	7,380
CFM-CLG:	0
%OA:	25%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,180.71	143.82	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	947.51	
Sub Total	0.00	11,296.05	1,091.33	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	15.76	
DDC Control	0.00	0.00	494.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>11,296.05</b>	<b>1,601.13</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914 BUILDING NAME: EXC MAIN RETL  
Building UA: 18,359 CONDITIONED SQFT: 63,930

**SYSTEM INFORMATION**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Catagory Number: 17 Construction: BRICK AND CMU Use: RETAIL SHOP Occupancy HRS: 0800-2200 Occupancy Days: M-F; SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	9,620
CFM-CLG:	9,620
%OA:	10%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	32,570.91	75.93	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	19,856.40	1,311.93	
Sub Total	0.00	54,548.80	1,387.87	
Economizer	0.00	12,189.23	0.00	
Ventilation/Recirculation	0.00	68.36	5.11	
DDC Control	0.00	10,076.43	684.06	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>76,882.82</b>	<b>2,077.03</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	17 BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	6,790
CFM-CLG:	6,790
%OA:	10%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type: 10  
System Name: Multizone air handling unit  
System Number: AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	25,152.18	53.60	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	14,015.07	874.62	
Sub Total	0.00	40,810.06	928.22	
Economizer	0.00	8,603.41	0.00	
Ventilation/Recirculation	0.00	48.25	3.60	
DDC Control	0.00	7,112.16	456.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>56,573.89</b>	<b>1,387.86</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	5.00
HP Effic:	0.73
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,000,000
BLR CAP OUTPUT (BTUH):	1,600,000

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,411.34	0.00	
Opt ST/SP	0.00	1,250.16	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	12,661.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	11.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>12,661.51</b>	<b>11.34</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6914****BUILDING NAME: EXC MAIN RETL**

<b>Building UA:</b>	<b>18,359</b>	<b>CONDITIONED SQFT:</b>	<b>63,930</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>7</b>
<b>System Name:</b>	<b>Large air cooled chiller</b>
<b>System Number:</b>	<b>CH-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>17 BRICK AND CMU</b>	<b>RETAIL SHOP</b>	<b>0800-2200</b>	<b>M-F; SAT-SUN</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>10</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>
<b>REQ STOP:</b>	<b>19</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>21</b>

**INPUTS**

<b>Motor HP:</b>	<b>7.50</b>
<b>HP Effic:</b>	<b>0.83</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>127</b>
<b>KW-TON:</b>	<b>1.10</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>17.4</b>
<b>HOAUH:</b>	<b>28</b>
<b>COAUHC:</b>	<b>0.000233</b>
<b>COAUC:</b>	<b>0.000615</b>
<b>HOAOHC:</b>	<b>36.7</b>
<b>HOAOH:</b>	<b>59.1</b>
<b>COAOHC:</b>	<b>0.00124</b>
<b>COAOC:</b>	<b>0.00328</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.000795</b>
<b>ECHC:</b>	<b>0.0003</b>
<b>NSUCHC:</b>	<b>0.000455</b>
<b>NSUCC:</b>	<b>0.0012</b>
<b>DDCCHC:</b>	<b>0.000248</b>
<b>DDCCC:</b>	<b>0.000657</b>
<b>NSC:</b>	<b>397000</b>
<b>DDCH:</b>	<b>207000</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,620</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>2,592</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>4,224</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>1,740</b>	
<b>HTG HRS SAVED:</b>	<b>2,784</b>	
<b>C/H HRS SAVED:</b>	<b>4,536</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,372.13	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	11,014.95	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	2,222.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	106.87	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>110.99</b>	<b>13,237.45</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

Building UA:	18,359	CONDITIONED SQFT:	63,930
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**SYSTEM INFORMATION**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	127
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type:	7
System Name:	Large air cooled chiller
System Number:	CH-2

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,372.13	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	11,014.95	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	2,222.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	106.87	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				6.00
<b>TOTAL</b>	<b>110.99</b>	<b>13,237.45</b>	<b>0.00</b>	<b>6.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
12	Chilled water reset - Large Air Cooled Chiller	0	0	0	4	\$1,133.00
16	Alarms - Chiller	0	0	2	0	\$281.00
43	Chiller demand limiting - Large Air Cooled Chiller	5	0	0	0	\$530.00
<b>TOTAL:</b>		<b>6</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>\$2,330.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6914 BUILDING NAME: EXC MAIN RETL  
Building UA: 18,359 CONDITIONED SQFT: 63,930

**SYSTEM INFORMATION**

System Type: 26  
System Name: Pump  
System Number: HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
17 BRICK AND CMU RETAIL SHOP 0800-2200 M-F, SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	10	9	9	9	9	9	9
REQ STOP:	19	21	21	21	21	21	21

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,620	3,360
HTG HRS ON:	2,592	5,376
H/C HRS ON:	4,224	8,760
CLG HRS SAVED:	1,740	
HTG HRS SAVED:	2,784	
C/H HRS SAVED:	4,536	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 6914

BUILDING NAME: EXC MAIN RETL

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,180.71	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	11,296.05	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>11,296.05</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**BUILDING 6918  
SKILL DEVELOPMENT CENTER**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	20%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,894.20	109.14	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	5,715.69	20.03	
Sub Total	0.00	16,076.62	129.18	
Economizer	0.00	719.49	0.00	
Ventilation/Recirculation	0.00	0.00	5.15	
DDC Control	0.00	843.38	20.95	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>17,639.49</b>	<b>155.28</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA: 3,864

CONDITIONED SQFT: 11,507

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,400
CFM-CLG:	1,400
%OA:	15%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,923.29	28.65	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,000.49	6.48	
Sub Total	0.00	5,061.68	35.13	
Economizer	0.00	251.82	0.00	
Ventilation/Recirculation	0.00	0.00	1.35	
DDC Control	0.00	295.18	6.78	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,608.68</b>	<b>43.26</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 6918****BUILDING NAME: SKILL DEV CTR****Building UA:** 3,864**CONDITIONED SQFT:** 11,507**SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-3

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
21	BRICK AND CMU	TRAINING	0700-2100	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	9	9	9	9	9	0
<b>REQ STOP:</b>	0	17	17	17	21	17	0

**INPUTS**

<b>Motor HP:</b>	0.50
<b>HP Effic:</b>	0.66
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,400
<b>CFM-CLG:</b>	1,400
<b>%OA:</b>	15%
<b>%Area:</b>	6%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	21.1
<b>HOAUH:</b>	34
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	17.3
<b>HOAOH:</b>	27.9
<b>COAOHC:</b>	0.000885
<b>COAOC:</b>	0.00234
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.000207
<b>ECHC:</b>	0.0000784
<b>NSUCHC:</b>	0.000221
<b>NSUCC:</b>	0.000584
<b>DDCCHC:</b>	0.0000919
<b>DDCCC:</b>	0.000243
<b>NSC:</b>	30500
<b>DDCH:</b>	31900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	880	3,360
<b>HTG HRS ON:</b>	1,408	5,376
<b>H/C HRS ON:</b>	2,294	8,760
<b>CLG HRS SAVED:</b>	2,480	
<b>HTG HRS SAVED:</b>	3,968	
<b>C/H HRS SAVED:</b>	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,923.29	28.65	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,000.49	6.48	
Sub Total	0.00	5,061.68	35.13	
Economizer	0.00	251.82	0.00	
Ventilation/Recirculation	0.00	0.00	1.35	
DDC Control	0.00	295.18	6.78	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,608.68</b>	<b>43.26</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MUA-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,000
CFM-CLG:	0
%OA:	100%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6918****BUILDING NAME: SKILL DEV CTR****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: MUA-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,800.21	404.74	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,169.18	404.74	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,169.18</b>	<b>404.74</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	15%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: RTU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,653.44	81.86	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	5,715.69	21.21	
Sub Total	0.00	21,060.36	103.07	
Economizer	0.00	719.49	0.00	
Ventilation/Recirculation	0.00	0.00	3.86	
DDC Control	0.00	843.38	22.19	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>22,623.23</b>	<b>129.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918	BUILDING NAME: SKILL DEV CTR
Building UA: 3,864	CONDITIONED SQFT: 11,507

**SYSTEM INFORMATION**

System Type: 15
System Name: Small Single Zone air handling unit
System Number: RTU-2

**TYPICAL BUILDING INFORMATION**

Category Number: 21	Construction: BRICK AND CMU	Use: TRAINING	Occupancy HRS: 0700-2100	Occupancy Days: M-F
Weeks of Winter: 32				
Weeks of Summer: 20				

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,920
CFM-CLG:	1,920
%OA:	15%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6918****BUILDING NAME: SKILL DEV CTR****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: RTU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,846.57	39.29	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,743.53	14.14	
Sub Total	0.00	8,865.90	53.43	
Economizer	0.00	345.35	0.00	
Ventilation/Recirculation	0.00	0.00	1.85	
DDC Control	0.00	404.82	14.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,616.08</b>	<b>70.08</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,920
CFM-CLG:	1,920
%OA:	15%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 6918****BUILDING NAME: SKILL DEV CTR****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,846.57	39.29	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,743.53	14.14	
Sub Total	0.00	8,865.90	53.43	
Economizer	0.00	345.35	0.00	
Ventilation/Recirculation	0.00	0.00	1.85	
DDC Control	0.00	404.82	14.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,616.08</b>	<b>70.08</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,920
CFM-CLG:	1,920
%OA:	15%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-4

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,846.57	39.29	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,743.53	14.14	
Sub Total	0.00	8,865.90	53.43	
Economizer	0.00	345.35	0.00	
Ventilation/Recirculation	0.00	0.00	1.85	
DDC Control	0.00	404.82	14.79	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,616.08</b>	<b>70.08</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

Building UA:	3,864	CONDITIONED SQFT:	11,507
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	9	9	0
REQ STOP:	0	17	17	17	21	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	4,000
CFM-CLG:	4,000
%OA:	15%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6918

BUILDING NAME: SKILL DEV CTR

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	RTU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,653.44	81.86	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	5,715.69	21.21	
Sub Total	0.00	21,060.36	103.07	
Economizer	0.00	719.49	0.00	
Ventilation/Recirculation	0.00	0.00	3.86	
DDC Control	0.00	843.38	22.19	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>22,623.23</b>	<b>129.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**BUILDING 6940**  
**INDOOR SWIMMING POOL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

Building UA: 3,037

CONDITIONED SQFT: 23,347

**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
15	BRICK AND CMU	SWIMMING POOL	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	11	11	11	11	11	11
REQ STOP:	20	20	20	20	20	20	20

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,800,000
BLR CAP OUTPUT (BTUH):	2,240,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000351
NSUCC:	0.000929
DDCCHC:	0.00000839
DDCCC:	0.0000222
NSC:	87100
DDCH:	34300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,648.59	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,161.33	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	15.88	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,161.33</b>	<b>15.88</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

Building UA:	3,037	CONDITIONED SQFT:	23,347
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**SYSTEM INFORMATION**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	15 BRICK AND CMU	SWIMMING POOL	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	11	11	11	11	11	11
REQ STOP:	20	20	20	20	20	20	20

**INPUTS**

Motor HP:	30.00
HP Effic:	0.87
Load Factor:	0.80
CFM-HTG:	24,800
CFM-CLG:	0
%OA:	100%
%Area:	77%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000351
NSUCC:	0.000929
DDCCHC:	0.00000839
DDCCC:	0.0000222
NSC:	87100
DDCH:	34300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

**ENERGY CALCULATION SUMMARY**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	69,385.74	0.00	
Opt ST/SP	0.00	6,298.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	61.10	
Sub Total	0.00	75,684.15	61.10	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	24.06	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>75,684.15</b>	<b>85.16</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>\$1,782.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6940 BUILDING NAME: INDOOR SWIM POOL  
 Building UA: 3,037 CONDITIONED SQFT: 23,347

**SYSTEM INFORMATION**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: HV-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	11	11	11	11	11	11
REQ STOP:	20	20	20	20	20	20	20

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	7,000
CFM-CLG:	0
%OA:	100%
%Area:	23%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	12,287.06	790.27	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	296.87	
Sub Total	0.00	13,402.40	1,087.14	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	7.68	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,402.40</b>	<b>1,094.82</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 6940 BUILDING NAME: INDOOR SWIM POOL  
Building UA: 3,037 CONDITIONED SQFT: 23,347

**SYSTEM INFORMATION**

System Type: 26  
System Name: Pump  
System Number: HWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
15	BRICK AND CMU	SWIMMING POOL	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	11	11	11	11	11	11
REQ STOP:	20	20	20	20	20	20	20

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,260	3,360
HTG HRS ON:	2,016	5,376
H/C HRS ON:	3,285	8,760
CLG HRS SAVED:	2,100	
HTG HRS SAVED:	3,360	
C/H HRS SAVED:	5,475	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000351
NSUCC:	0.000929
DDCCHC:	0.00000839
DDCCC:	0.0000222
NSC:	87100
DDCH:	34300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 6940

BUILDING NAME: INDOOR SWIM POOL

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,897.76	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,160.80	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,160.80</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 7017**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7017****BUILDING NAME: BN HQ BLDG**

Building UA:	1,162	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	8
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7017

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	140.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	6.73	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>6.73</b>	<b>140.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7017

BUILDING NAME: BN HQ BLDG

Building UA:	1,162	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	3,250
CFM-CLG:	3,250
%OA:	25%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7017

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,032.61	74.12	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.76	0.00	0.00	
Night Setback	0.00	17,222.32	42.53	
Sub Total	1.76	23,517.97	116.65	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,369.11	34.98	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.76</b>	<b>25,887.08</b>	<b>151.63</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**BUILDING 7024**  
**GYMNASIUM**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024 BUILDING NAME: GYMNASIUM  
Building UA: 2,682 CONDITIONED SQFT: 20,619

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,898,000
BLR CAP OUTPUT (BTUH):	2,318,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760

CLG HRS SAVED:	1,460
HTG HRS SAVED:	2,336
C/H HRS SAVED:	3,806

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTION NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024

BUILDING NAME: GYMNASIUM

Building UA:	2,682	CONDITIONED SQFT:	20,619
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	IM-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	650,000
BLR CAP OUTPUT (BTUH):	520,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024

BUILDING NAME: GYMNASIUM

Building UA:	2,682	CONDITIONED SQFT:	20,619
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.12
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	1,250
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	261.40	98.11	
Opt ST/SP	0.00	34.13	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	56.99	
Sub Total	0.00	295.53	155.10	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	1.48	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>295.53</b>	<b>156.58</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024 BUILDING NAME: GYMNASIUM  
Building UA: 2,682 CONDITIONED SQFT: 20,619

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: FC-2

**TYPICAL BUILDING INFORMATION**

Catagory Number: 16 Construction: BRICK AND CMU Use: GYMNASIUM Occupancy HRS: 0600-2200 Occupancy Days: M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.12
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	1,250
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	FC-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	261.40	98.11	
Opt ST/SP	0.00	34.13	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	56.99	
Sub Total	0.00	295.53	155.10	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	1.48	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>295.53</b>	<b>155.58</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024 BUILDING NAME: GYMNASIUM  
Building UA: 2,682 CONDITIONED SQFT: 20,619

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
16 BRICK AND CMU GYMNASIUM 0600-2200 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	0
%OA:	100%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,825.93	651.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	205.17	
Sub Total	0.00	3,194.90	856.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	5.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,194.90</b>	<b>861.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024

BUILDING NAME: GYMNASIUM

Building UA:	2,682	CONDITIONED SQFT:	20,619
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	0
%OA:	100%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7024****BUILDING NAME: GYMNASIUM****ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,825.93	651.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	205.17	
Sub Total	0.00	3,194.90	856.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	5.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,194.90</b>	<b>861.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024 BUILDING NAME: GYMNASIUM  
Building UA: 2,682 CONDITIONED SQFT: 20,619

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-3

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
16 BRICK AND CMU GYMNASIUM 0600-2200 M-F; SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	0
%QA:	100%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,825.93	651.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	205.17	
Sub Total	0.00	3,194.90	856.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	5.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,194.90</b>	<b>861.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7024	BUILDING NAME: GYMNASIUM
Building UA: 2,682	CONDITIONED SQFT: 20,619

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
16	BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	0
%OA:	100%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAOHC:	27.8
HOAOH:	44.7
COAOHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,825.93	651.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	205.17	
Sub Total	0.00	3,194.90	856.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	5.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,194.90</b>	<b>861.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7024****BUILDING NAME: GYMNASIUM**

Building UA:	2,682	CONDITIONED SQFT:	20,619
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	16 BRICK AND CMU	GYMNASIUM	0600-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	6	6	6	6	6	9
REQ STOP:	19	21	21	21	21	21	19

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	8,300
CFM-CLG:	0
%OA:	100%
%Area:	18%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,900	3,360
HTG HRS ON:	3,040	5,376
H/C HRS ON:	4,954	8,760
CLG HRS SAVED:	1,460	
HTG HRS SAVED:	2,336	
C/H HRS SAVED:	3,806	

**CONSTANTS**

HOAUHC:	20.9
HOAUH:	33.6
COAUHC:	0.000213
COAUC:	0.000562
HOAHC:	27.8
HOAOH:	44.7
COAHC:	0.000391
COAOC:	0.00103
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000022
ECHC:	0.0000083
NSUCHC:	0.000637
NSUCC:	0.00168
DDCCHC:	0.0000143
DDCCC:	0.0000378
NSC:	425000
DDCH:	11000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7024

BUILDING NAME: GYMNASIUM

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,825.93	651.46	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	205.17	
Sub Total	0.00	3,194.90	856.64	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	5.31	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,194.90</b>	<b>861.95</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 7028  
BN CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7028

BUILDING NAME: BN CLASSROOMS

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.16
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	659,000
BLR CAP OUTPUT (BTUH):	527,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7028

BUILDING NAME: BN CLASSROOMS

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	491.76	0.00	
Opt ST/SP	0.00	45.51	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	537.27	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	3.74	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>537.27</b>	<b>3.74</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7028

BUILDING NAME: BN CLASSROOMS

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7028

BUILDING NAME: BN CLASSROOMS

**ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,497.11	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.47	6,866.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>6,866.08</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7028****BUILDING NAME: BN CLASSROOMS**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	4,400
CFM-CLG:	4,400
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7028

BUILDING NAME: BN CLASSROOMS

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,631.85	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	22,236.91	63.06	
Sub Total	0.00	27,131.80	63.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>27,131.80</b>	<b>63.06</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7031**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7031 BUILDING NAME: BN HQ BLDG  
Building UA: 1,723 CONDITIONED SQFT: 3,733

**SYSTEM INFORMATION**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F, SAT  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	528,000
BLR CAP OUTPUT (BTUH):	381,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7031

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.99	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>2.99</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7031****BUILDING NAME: BN HQ BLDG**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7031

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,642.32	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.38	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.38	3,849.17	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.38</b>	<b>3,849.17</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7031****BUILDING NAME: BN HQ BLDG**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	4,400
CFM-CLG:	4,400
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7031

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,631.85	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	22,236.91	63.06	
Sub Total	0.00	27,131.80	63.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>27,131.80</b>	<b>63.06</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7033**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7033****BUILDING NAME: BN HQ BLDG**

Building UA:	1,960	CONDITIONED SQFT:	4,083
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,400
CFM-CLG:	4,400
%OA:	15%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7033

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	10,015.91	63.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	24,395.83	71.74	
Sub Total	3.12	34,878.47	134.73	
Economizer	0.00	1,003.18	0.00	
Ventilation/Recirculation	0.00	51.73	3.26	
DDC Control	0.00	2,940.13	59.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>38,873.51</b>	<b>196.99</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7033****BUILDING NAME: BN HQ BLDG**

<b>Building UA:</b>	1,960	<b>CONDITIONED SQFT:</b>	4,083
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**SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	18	18	18	18	18	0

**INPUTS**

<b>Motor HP:</b>	0.32
<b>HP Effic:</b>	0.64
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	299,000
<b>BLR CAP OUTPUT (BTUH):</b>	229,000

**CONSTANTS**

<b>HOAUHC:</b>	16.2
<b>HOAUH:</b>	26.1
<b>COAUHC:</b>	0.000257
<b>COAUC:</b>	0.00068
<b>HOAOHC:</b>	33.3
<b>HOAOH:</b>	53.5
<b>COAOHC:</b>	0.00115
<b>COAOC:</b>	0.00305
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00021
<b>ECHC:</b>	0.0000795
<b>NSUCHC:</b>	0.000941
<b>NSUCC:</b>	0.00249
<b>DDCCHC:</b>	0.000233
<b>DDCCC:</b>	0.000616
<b>NSC:</b>	36600
<b>DDCH:</b>	30100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,100	3,360
<b>HTG HRS ON:</b>	1,760	5,376
<b>H/C HRS ON:</b>	2,868	8,760
<b>CLG HRS SAVED:</b>	2,260	
<b>HTG HRS SAVED:</b>	3,616	
<b>C/H HRS SAVED:</b>	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7033

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,079.01	0.00	
Opt ST/SP	0.00	91.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,170.03	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.70	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,170.03</b>	<b>1.70</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**BUILDING 7034  
CLINIC W/O BEDS**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 7034

BUILDING NAME: CLINIC W/O BEDS

Building UA:	1,595	CONDITIONED SQFT:	3,842
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	3,720
CFM-CLG:	3,720
%OA:	20%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY:

BLDG: 7034

BUILDING NAME: CLINIC W/O BEDS

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	28,039.20	229.80	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	3,273.07	57.42	
Sub Total	0.00	32,427.62	287.22	
Economizer	0.00	3,025.95	0.00	
Ventilation/Recirculation	0.00	274.57	11.39	
DDC Control	0.00	1,154.13	64.28	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>0.00</b>	<b>36,882.28</b>	<b>362.89</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

**ENERGY CALCULATION PARAMETERS**

BLDG: 7034

BUILDING NAME: CLINIC W/O BEDS

Building UA:	1,595	CONDITIONED SQFT:	3,842
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
10	BRICK AND CMU	DENTAL CLINIC	0800-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	468,000
BLR CAP OUTPUT (BTUH):	281,000

**CONSTANTS**

HOAUHC:	50.2
HOAUH:	80.7
COAUHC:	0.00121
COAUC:	0.0032
HOAOHC:	45.3
HOAOH:	72.8
COAOHC:	0.0017
COAOC:	0.0045
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000826
ECHC:	0.000312
NSUCHC:	0.000143
NSUCC:	0.000379
DDCCHC:	0.000119
DDCCC:	0.000316
NSC:	36000
DDCH:	40300
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY:

BLDG: 7034

BUILDING NAME: CLINIC W/O BEDS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**BUILDING 7036**  
**REGIMENTAL HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7036 BUILDING NAME: REGIMENTAL HQ BLDG  
Building UA: 2,605 CONDITIONED SQFT: 10,010

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F; SAT

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP: 1.50  
HP Effic: 0.74  
Load Factor: 0.80  
CFM-HTG: 1,787  
CFM-CLG: 1,787  
%OA: 0%  
%Area: 28%  
CHILLER CAP (TONS): 0  
KW-TON: 0.00  
BLR CAP INPUT (BTUH): 0  
BLR CAP OUTPUT (BTUH): 0

**CONSTANTS**

HOAUHC: 16.2  
HOAUH: 26.1  
COAUHC: 0.000257  
COAUC: 0.00068  
HOAOHC: 33.3  
HOAOH: 53.5  
COAOHC: 0.00115  
COAOC: 0.00305  
DC DUTY: 0.17  
DC DEMAND: 0.17  
ECC: 0.00021  
ECHC: 0.0000795  
NSUCHC: 0.000941  
NSUCC: 0.00249  
DDCCHC: 0.000233  
DDCCC: 0.000616  
NSC: 36600  
DDCH: 30100  
OPT: 305  
CHWR: 17.5  
CNWR: 0  
OAR: 5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7036****BUILDING NAME: REGIMENTAL HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,497.11	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	9,031.22	26.70	
Sub Total	2.47	15,897.30	26.70	
Economizer	0.00	481.50	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	1,411.20	21.95	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>17,790.00</b>	<b>48.65</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7036

BUILDING NAME: REGIMENTAL HQ BLDG

Building UA:	2,605	CONDITIONED SQFT:	10,010
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2/BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	864,000
BLR CAP OUTPUT (BTUH):	591,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7036

BUILDING NAME: REGIMENTAL HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
 System Name: Small hot water boiler  
 System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,235.29	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,442.13	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.90	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,442.13</b>	<b>4.90</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7036****BUILDING NAME: REGIMENTAL HQ BLDG**

Building UA:	2,605	CONDITIONED SQFT:	10,010
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	10,100
CFM-CLG:	10,100
%OA:	0%
%Area:	36%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7036****BUILDING NAME: REGIMENTAL HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,642.32	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	9,546.98	10.22	
Sub Total	0.00	13,396.15	10.22	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,396.15</b>	<b>10.22</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7036****BUILDING NAME: REGIMENTAL HQ BLDG**

Building UA:	2,605	CONDITIONED SQFT:	10,010
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	10,100
CFM-CLG:	10,100
%OA:	0%
%Area:	36%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7036

BUILDING NAME: REGIMENTAL HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,642.32	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	9,546.98	10.22	
Sub Total	0.00	13,396.15	10.22	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,396.15</b>	<b>10.22</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7046**  
**BN CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7046****BUILDING NAME: BN CLASSROOMS**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	528,000
BLR CAP OUTPUT (BTUH):	381,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7046****BUILDING NAME: BN CLASSROOMS****ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	245.88	0.00	
Opt ST/SP	0.00	22.75	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	268.63	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.99	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>268.63</b>	<b>2.99</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7046****BUILDING NAME: BN CLASSROOMS**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	1.50
HP Effc:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7046****BUILDING NAME: BN CLASSROOMS****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,497.11	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.47	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.47	6,866.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.47</b>	<b>6,866.08</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7046****BUILDING NAME: BN CLASSROOMS**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.18
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	4,400
CFM-CLG:	4,400
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7046

BUILDING NAME: BN CLASSROOMS

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	901.47	0.00	
Opt ST/SP	0.00	51.19	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	22,236.91	63.06	
Sub Total	0.00	23,189.57	63.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>23,189.57</b>	<b>63.06</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7047**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7047

BUILDING NAME: BN HQ BLDG

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	528,000
BLR CAP OUTPUT (BTUH):	381,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7047****BUILDING NAME: BN HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.99	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>2.99</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7047****BUILDING NAME: BN HQ BLDG**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 7047

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,663.96	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.92	2,801.86	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>2,801.86</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7047****BUILDING NAME: BN HQ BLDG**

Building UA:	1,723	CONDITIONED SQFT:	3,733
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.18
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	4,400
CFM-CLG:	4,400
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7047

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	989.00	0.00	
Opt ST/SP	0.00	51.19	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	24,395.83	63.06	
Sub Total	0.00	25,436.02	63.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>25,436.02</b>	<b>63.06</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7048**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7048

BUILDING NAME: BN HQ BLDG

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	330,000
BLR CAP OUTPUT (BTUH):	257,400

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 7048

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.87	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>1.87</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7048

BUILDING NAME: BN HQ BLDG

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**BLDG: 7048****BUILDING NAME: BN HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,819.13	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.38	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.38	4,025.98	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.38</b>	<b>4,025.98</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 7048****BUILDING NAME: BN HQ BLDG****Building UA:** 1,202**CONDITIONED SQFT:** 2,604**SYSTEM INFORMATION**

<b>System Type:</b>	19
<b>System Name:</b>	Fan coil unit
<b>System Number:</b>	FC-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	6	6	6	6	6	0
<b>REQ STOP:</b>	0	18	18	18	18	18	0

**INPUTS**

<b>Motor HP:</b>	0.67
<b>HP Effic:</b>	0.64
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	3,600
<b>CFM-CLG:</b>	3,600
<b>%OA:</b>	0%
<b>%Area:</b>	100%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	16.2
<b>HOAUH:</b>	26.1
<b>COAUHC:</b>	0.000257
<b>COAUC:</b>	0.00068
<b>HOAOHC:</b>	33.3
<b>HOAOH:</b>	53.5
<b>COAOHC:</b>	0.00115
<b>COAOC:</b>	0.00305
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00021
<b>ECHC:</b>	0.0000795
<b>NSUCHC:</b>	0.000941
<b>NSUCC:</b>	0.00249
<b>DDCCHC:</b>	0.000233
<b>DDCCC:</b>	0.000616
<b>NSC:</b>	36600
<b>DDCH:</b>	30100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,200	3,360
<b>HTG HRS ON:</b>	1,920	5,376
<b>H/C HRS ON:</b>	3,129	8,760
<b>CLG HRS SAVED:</b>	2,160	
<b>HTG HRS SAVED:</b>	3,456	
<b>C/H HRS SAVED:</b>	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN

BLDG: 7048

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,518.38	0.00	
Opt ST/SP	0.00	190.56	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	19,077.03	43.99	
Sub Total	0.00	22,785.96	43.99	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>22,785.96</b>	<b>43.99</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7050**  
**ENLISTED BARRACKS W/AS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	7,330
CFM-CLG:	7,330
%OA:	20%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,419.55	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	0.00	8.43	
<b>Sub Total</b>	<b>14.19</b>	<b>13,419.55</b>	<b>8.43</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,783.84	14.29	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>14.19</b>	<b>16,203.40</b>	<b>22.73</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS**

<b>Building UA:</b>	<b>7,027</b>	<b>CONDITIONED SQFT:</b>	<b>39,675</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>1</b>
<b>System Name:</b>	<b>Small hot water boiler</b>
<b>System Number:</b>	<b>BLR-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>5BRICK AND CMU</b>	<b>BARRACKS</b>	<b>0000-2400</b>	<b>M-F; SAT-SUN</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	<b>1.50</b>
<b>HP Effic:</b>	<b>0.74</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>8%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>2,186,000</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>1,749,000</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0</b>
<b>NSUCC:</b>	<b>0</b>
<b>DDCCHC:</b>	<b>0.0000556</b>
<b>DDCCC:</b>	<b>0.000147</b>
<b>NSC:</b>	<b>20000</b>
<b>DDCH:</b>	<b>33900</b>
<b>OPT:</b>	<b>0</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>3,360</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>5,376</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>8,760</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>0</b>	
<b>HTG HRS SAVED:</b>	<b>0</b>	
<b>C/H HRS SAVED:</b>	<b>0</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	12.39	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>12.39</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA: 7,027

CONDITIONED SQFT: 39,675

**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,186,000
BLR CAP OUTPUT (BTUH):	1,749,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	12.39	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>12.39</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050 BUILDING NAME: ENL BARRACKS W/AS  
Building UA: 7,027 CONDITIONED SQFT: 39,675

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
5	BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,506,000
BLR CAP OUTPUT (BTUH):	1,204,800

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760

CLG HRS SAVED:	740
HTG HRS SAVED:	1,184
C/H HRS SAVED:	1,929

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.17
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,200,000
BLR CAP OUTPUT (BTUH):	972,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	6.80	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>6.80</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	900,000
BLR CAP OUTPUT (BTUH):	900,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.10	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.10</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvtr; Optimum start/stop control - STM-HW Cnvtr; Night setback - STM-HW Cnvtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.43	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.43	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.43</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,683.33	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	7.03	
Sub Total	0.00	2,683.33	7.03	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	11.91	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,683.33</b>	<b>18.94</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7050****BUILDING NAME: ENL BARRACKS W/AS**

<b>Building UA:</b>	<b>7,027</b>	<b>CONDITIONED SQFT:</b>	<b>39,675</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>25</b>
<b>System Name:</b>	<b>Hot water radiation pump</b>
<b>System Number:</b>	<b>RAD-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Catagory Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>5 BRICK AND CMU</b>	<b>BARRACKS</b>	<b>0000-2400</b>	<b>M-F, SAT-SUN</b>
<b>Weeks of Winter:</b>	<b>32</b>			
<b>Weeks of Summer:</b>	<b>20</b>			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>REQ STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>

**INPUTS**

<b>Motor HP:</b>	<b>0.75</b>
<b>HP Effic:</b>	<b>0.66</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>8%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0</b>
<b>NSUCC:</b>	<b>0</b>
<b>DDCCHC:</b>	<b>0.0000556</b>
<b>DDCCC:</b>	<b>0.000147</b>
<b>NSC:</b>	<b>20000</b>
<b>DDCH:</b>	<b>33900</b>
<b>OPT:</b>	<b>0</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>3,360</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>5,376</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>8,760</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>0</b>	
<b>HTG HRS SAVED:</b>	<b>0</b>	
<b>C/H HRS SAVED:</b>	<b>0</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7050

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7053  
ENLISTED BARRACKS W/AS**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,186,000
BLR CAP OUTPUT (BTUH):	1,749,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	12.39	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>12.39</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS**

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,186,000
BLR CAP OUTPUT (BTUH):	1,749,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	12.39	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>12.39</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5/BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.50
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	579,150

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.43	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.43	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.43</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

Building UA:	7,027	CONDITIONED SQFT:	39,675
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type: 24  
System Name: Dual temperature water pump  
System Number: DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	3.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7053

BUILDING NAME: ENL BARRACKS W/AS

Building UA: 7,027

CONDITIONED SQFT: 39,675

**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	8%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7053****BUILDING NAME: ENL BARRACKS W/AS****ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7086  
UNIT CHAPEL**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

Building UA:	2,856	CONDITIONED SQFT:	8,696
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8BRICK AND CMU	CHURCH	0700-1800	SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	0	0	0	0	0	10
REQ STOP:	14	0	0	0	0	0	13

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	5,400
CFM-CLG:	5,400
%OA:	30%
%Area:	67%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	160	3,360
HTG HRS ON:	256	5,376
H/C HRS ON:	417	8,760
CLG HRS SAVED:	3,200	
HTG HRS SAVED:	5,120	
C/H HRS SAVED:	8,343	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	23,584.00	227.06	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	9,100.39	195.18	
<b>Sub Total</b>	<b>4.62</b>	<b>33,375.62</b>	<b>422.24</b>	
Economizer	0.00	272.56	0.00	
Ventilation/Recirculation	0.00	170.96	8.30	
DDC Control	0.00	1,320.01	106.58	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.62</b>	<b>35,139.14</b>	<b>537.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7086****BUILDING NAME: UNIT CHAPEL**

Building UA:	2,856	CONDITIONED SQFT:	8,696
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	9	9	9	9	9	10
REQ STOP:	14	17	17	17	17	17	13

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,308,000
BLR CAP OUTPUT (BTUH):	907,000

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	7.42	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>7.42</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7086 BUILDING NAME: UNIT CHAPEL  
Building UA: 2,856 CONDITIONED SQFT: 8,696

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
8BRICK AND CMU CHURCH 0700-1800 SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	0	0	0	0	0	10
REQ STOP:	14	0	0	0	0	0	13

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	160	3,360
HTG HRS ON:	256	5,376
H/C HRS ON:	417	8,760
CLG HRS SAVED:	3,200	
HTG HRS SAVED:	5,120	
C/H HRS SAVED:	8,343	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7086****BUILDING NAME: UNIT CHAPEL****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>16.83</b>	<b>350.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7086****BUILDING NAME: UNIT CHAPEL**

Building UA:	2,856	CONDITIONED SQFT:	8,696
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	9	9	9	9	9	10
REQ STOP:	14	17	17	17	17	17	13

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	10
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7086****BUILDING NAME: UNIT CHAPEL****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	175.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	8.42	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>8.42</b>	<b>175.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

Building UA:	2,856	CONDITIONED SQFT:	8,696
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	8 BRICK AND CMU	CHURCH	0700-1800	SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	9	9	9	9	9	10
REQ STOP:	14	17	17	17	17	17	13

**INPUTS**

Motor HP:	1.50
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	IDTWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,117.96	0.00	
Opt ST/SP	0.00	395.70	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.65	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.65	8,513.67	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.65</b>	<b>8,513.67</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7086****BUILDING NAME: UNIT CHAPEL**

Building UA:	2,856	CONDITIONED SQFT:	8,696
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**SYSTEM INFORMATION**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
8	BRICK AND CMU	CHURCH	0700-1800	SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	9	9	9	9	9	10
REQ STOP:	14	17	17	17	17	17	13

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.8
HOAUH:	27
COAUHC:	0.000346
COAUC:	0.000915
HOAOHC:	71.1
HOAOH:	114
COAOHC:	0.00247
COAOC:	0.00652
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00032
ECHC:	0.000121
NSUCHC:	0.000202
NSUCC:	0.000533
DDCCHC:	0.000586
DDCCC:	0.00155
NSC:	102000
DDCH:	55700
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7086

BUILDING NAME: UNIT CHAPEL

**ENERGY CALCULATION SUMMARY**

System Type:	24
System Name:	Dual temperature water pump
System Number:	DTWP-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,243.48	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.38	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.38	4,450.33	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.38</b>	<b>4,450.33</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
22	Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Night setback - DTW Pump	1	0	1	4	\$1,418.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>\$1,418.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7086 BUILDING NAME: UNIT CHAPEL  
 Building UA: 2,856 CONDITIONED SQFT: 8,696

**SYSTEM INFORMATION**

System Type: 19  
 System Name: Fan coil unit  
 System Number: FC-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
 2BRICK AND CMU ADMINISTRATION 0600-1700 M-F

Weeks of Winter: 32  
 Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	9	9	9	9	9	10
REQ STOP:	14	17	17	17	17	17	13

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	3,300
CFM-CLG:	3,300
%OA:	20%
%Area:	33%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	960	3,360
HTG HRS ON:	1,536	5,376
H/C HRS ON:	2,503	8,760
CLG HRS SAVED:	2,400	
HTG HRS SAVED:	3,840	
C/H HRS SAVED:	6,257	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7086****BUILDING NAME: UNIT CHAPEL****ENERGY CALCULATION SUMMARY**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,243.48	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	3,634.15	10.27	
Sub Total	0.00	8,084.47	10.27	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,084.47</b>	<b>10.27</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7108**  
**BN ADMINISTRATION & CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7108

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA:	2,984	CONDITIONED SQFT:	12,527
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	7,820
CFM-CLG:	7,820
%OA:	10%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 7108

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	34,377.59	77.95	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	45,276.54	109.21	
<b>Sub Total</b>	<b>10.99</b>	<b>81,296.94</b>	<b>187.16</b>	
Economizer	0.00	1,620.83	0.00	
Ventilation/Recirculation	0.00	61.30	3.86	
DDC Control	0.00	4,750.37	89.82	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>87,729.44</b>	<b>280.84</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

## ENERGY CALCULATION PARAMETERS

BLDG: 7108

BUILDING NAME: BN ADMIN & CLRM

Building UA: 2,984

CONDITIONED SQFT: 12,527

### SYSTEM INFORMATION

System Type:	26
System Name:	Pump
System Number:	CWP-1

### TYPICAL BUILDING INFORMATION

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

### INPUTS

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

### CONSTANTS

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 7108****BUILDING NAME: BN ADMIN & CLRM****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,035.33	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	2,298.37	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.66</b>	<b>2,298.37</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7108****BUILDING NAME: BN ADMIN & CLRM**

Building UA:	2,984	CONDITIONED SQFT:	12,527
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 7108****BUILDING NAME: BN ADMIN & CLRM****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,513.05	0.00	
Opt ST/SP	0.00	526.08	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	7,039.14	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>7,039.14</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 7109**  
**BN ADMINISTRATION & CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA:	3,224	CONDITIONED SQFT:	13,535
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	16,950
CFM-CLG:	16,950
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	39,170.59	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	89,821.00	118.00	
<b>Sub Total</b>	<b>14.19</b>	<b>131,113.09</b>	<b>118.00</b>	
Economizer	0.00	4,215.83	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	12,355.82	97.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>14.19</b>	<b>147,684.74</b>	<b>215.04</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM**

<b>Building UA:</b>	3,224	<b>CONDITIONED SQFT:</b>	13,535
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**SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
7	BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	6	6	6	6	6	0
<b>REQ STOP:</b>	0	18	18	18	18	18	0

**INPUTS**

<b>Motor HP:</b>	1.50
<b>HP Effic:</b>	0.51
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	3,437,500
<b>BLR CAP OUTPUT (BTUH):</b>	2,750,000

**CONSTANTS**

<b>HOAUHC:</b>	16.2
<b>HOAUH:</b>	26.1
<b>COAUHC:</b>	0.000257
<b>COAUC:</b>	0.00068
<b>HOAOHC:</b>	33.3
<b>HOAOH:</b>	53.5
<b>COAOHC:</b>	0.00115
<b>COAOC:</b>	0.00305
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00021
<b>ECHC:</b>	0.0000795
<b>NSUCHC:</b>	0.000941
<b>NSUCC:</b>	0.00249
<b>DDCCHC:</b>	0.000233
<b>DDCCC:</b>	0.000616
<b>NSC:</b>	36600
<b>DDCH:</b>	30100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,200	3,360
<b>HTG HRS ON:</b>	1,920	5,376
<b>H/C HRS ON:</b>	3,129	8,760
<b>CLG HRS SAVED:</b>	2,160	
<b>HTG HRS SAVED:</b>	3,456	
<b>C/H HRS SAVED:</b>	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,126.33	0.00	
Opt ST/SP	0.00	540.66	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,666.99	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	19.49	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,666.99</b>	<b>19.49</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM**

<b>Building UA:</b>	<b>3,224</b>	<b>CONDITIONED SQFT:</b>	<b>13,535</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>6</b>
<b>System Name:</b>	<b>Small air cooled chiller</b>
<b>System Number:</b>	<b>CH-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>7</b>	<b>BRICK AND CMU</b>	<b>BATTALION</b>	<b>0700-1800</b>	<b>M-F; SAT</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>0</b>
<b>REQ STOP:</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>0</b>

**INPUTS**

<b>Motor HP:</b>	<b>2.00</b>
<b>HP Effic:</b>	<b>0.69</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>80</b>
<b>KW-TON:</b>	<b>1.10</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>16.2</b>
<b>HOAUH:</b>	<b>26.1</b>
<b>COAUHC:</b>	<b>0.000257</b>
<b>COAUC:</b>	<b>0.00068</b>
<b>HOAOHC:</b>	<b>33.3</b>
<b>HOAOH:</b>	<b>53.5</b>
<b>COAOHC:</b>	<b>0.00115</b>
<b>COAOC:</b>	<b>0.00305</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.00021</b>
<b>ECHC:</b>	<b>0.0000795</b>
<b>NSUCHC:</b>	<b>0.000941</b>
<b>NSUCC:</b>	<b>0.00249</b>
<b>DDCCHC:</b>	<b>0.000233</b>
<b>DDCCC:</b>	<b>0.000616</b>
<b>NSC:</b>	<b>36600</b>
<b>DDCH:</b>	<b>30100</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,200</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,920</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>3,129</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,160</b>	
<b>HTG HRS SAVED:</b>	<b>3,456</b>	
<b>C/H HRS SAVED:</b>	<b>5,631</b>	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,754.63	0.00	
Opt ST/SP	0.00	530.17	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.33	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.33	4,284.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,400.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	67.32	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>68.65</b>	<b>5,684.79</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM**

<b>Building UA:</b>	<b>3,224</b>	<b>CONDITIONED SQFT:</b>	<b>13,535</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>26</b>
<b>System Name:</b>	<b>Pump</b>
<b>System Number:</b>	<b>CWP-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>7</b>	<b>BRICK AND CMU</b>	<b>BATTALION</b>	<b>0700-1800</b>	<b>M-F; SAT</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>0</b>
<b>REQ STOP:</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>0</b>

**INPUTS**

<b>Motor HP:</b>	<b>7.50</b>
<b>HP Effic:</b>	<b>0.83</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>16.2</b>
<b>HOAUH:</b>	<b>26.1</b>
<b>COAUHC:</b>	<b>0.000257</b>
<b>COAUC:</b>	<b>0.00068</b>
<b>HOAOHC:</b>	<b>33.3</b>
<b>HOAOH:</b>	<b>53.5</b>
<b>COAOHC:</b>	<b>0.00115</b>
<b>COAOC:</b>	<b>0.00305</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.00021</b>
<b>ECHC:</b>	<b>0.0000795</b>
<b>NSUHC:</b>	<b>0.000941</b>
<b>NSUC:</b>	<b>0.00249</b>
<b>DDCCHC:</b>	<b>0.000233</b>
<b>DDCCC:</b>	<b>0.000616</b>
<b>NSC:</b>	<b>36600</b>
<b>DDCH:</b>	<b>30100</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,200</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,920</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>3,129</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,160</b>	
<b>HTG HRS SAVED:</b>	<b>3,456</b>	
<b>C/H HRS SAVED:</b>	<b>5,631</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,634.37	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	13,277.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.12</b>	<b>13,277.18</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM**

<b>Building UA:</b>	3,224	<b>CONDITIONED SQFT:</b>	13,535
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**SYSTEM INFORMATION**

<b>System Type:</b>	26
<b>System Name:</b>	Pump
<b>System Number:</b>	CWP-2

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

<b>Motor HP:</b>	7.50
<b>HP Effic:</b>	0.83
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**CONSTANTS**

<b>HOAUHC:</b>	16.2
<b>HOAUH:</b>	26.1
<b>COAUHC:</b>	0.000257
<b>COAUC:</b>	0.00068
<b>HOAOHC:</b>	33.3
<b>HOAOH:</b>	53.5
<b>COAOHC:</b>	0.00115
<b>COAOC:</b>	0.00305
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0.00021
<b>ECHC:</b>	0.0000795
<b>NSUCHC:</b>	0.000941
<b>NSUCC:</b>	0.00249
<b>DDCCHC:</b>	0.000233
<b>DDCCC:</b>	0.000616
<b>NSC:</b>	36600
<b>DDCH:</b>	30100
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,200	3,360
<b>HTG HRS ON:</b>	1,920	5,376
<b>H/C HRS ON:</b>	3,129	8,760
<b>CLG HRS SAVED:</b>	2,160	
<b>HTG HRS SAVED:</b>	3,456	
<b>C/H HRS SAVED:</b>	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

BLDG: 7109

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: CWP-2

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	11,634.37	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	13,277.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.12</b>	<b>13,277.18</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM**

Building UA:	3,224	CONDITIONED SQFT:	13,535
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	18	18	18	18	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS

**BLDG: 7109****BUILDING NAME: BN ADMIN & CLRM****ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,961.10	0.00	
Opt ST/SP	0.00	526.08	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,487.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,487.18</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 7176**  
**MOTOR POOL MAINTENANCE SHOP**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7176 BUILDING NAME: MOTOR POOL MNT SHOP  
Building UA: 2,032 CONDITIONED SQFT: 4,880

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	8	9	12	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,250,000
BLR CAP OUTPUT (BTUH):	1,000,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: CWW

BLDG: 7176

BUILDING NAME: MOTOR POOL MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7176

BUILDING NAME: MOTOR POOL MNT SHOP

Building UA:	2,032	CONDITIONED SQFT:	4,880
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	8	9	12	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	8,250
CFM-CLG:	0
%OA:	0%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW

BLDG: 7176

BUILDING NAME: MOTOR POOL MNT SHOP

**ENERGY CALCULATION SUMMARY**

System Type: 21

System Name: HW Unit heater

System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,909.76	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	42.16	
Sub Total	0.00	2,047.66	42.16	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,047.66</b>	<b>42.16</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7178**  
**MOTOR POOL ADMINISTRATION**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7178

BUILDING NAME: MOTOR POOL ADMIN

Building UA:	645	CONDITIONED SQFT:	2,480
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	8	9	12	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	600
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7178

BUILDING NAME: MOTOR POOL ADMIN

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	315.11	0.00	
Opt ST/SP	0.00	22.75	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	3.52	
Sub Total	0.00	337.86	3.52	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>337.86</b>	<b>3.52</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7178 BUILDING NAME: MOTOR POOL ADMIN  
Building UA: 645 CONDITIONED SQFT: 2,480

**SYSTEM INFORMATION**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	8	9	12	9	0
REQ STOP:	0	17	17	17	15	17	0

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	600
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HCAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7178****BUILDING NAME: MOTOR POOL ADMIN****ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	315.11	0.00	
Opt ST/SP	0.00	22.75	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	3.52	
Sub Total	0.00	337.86	3.52	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>337.86</b>	<b>3.52</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7212**  
**CO HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212

BUILDING NAME: CO HQ BLDG

Building UA:	7,306	CONDITIONED SQFT:	19,320
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7212****BUILDING NAME: CO HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,668.64	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	5,359.87	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>1.73</b>	<b>5,359.87</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212 BUILDING NAME: CO HQ BLDG  
Building UA: 7,306 CONDITIONED SQFT: 19,320

**SYSTEM INFORMATION**

System Type: 19  
System Name: Fan coil unit  
System Number: FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	7,200
%OA:	20%
%Area:	37%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7212

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,631.85	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	8,739.23	251.67	
Sub Total	0.00	13,634.12	251.67	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,634.12</b>	<b>251.67</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212	BUILDING NAME: CO HQ BLDG
Building UA: 7,306	CONDITIONED SQFT: 19,320

**SYSTEM INFORMATION**

System Type: 16
System Name: Heating and Ventilating Unit
System Number: HV-1

**TYPICAL BUILDING INFORMATION**

Category Number: 3	Construction: BRICK AND CMU	Use: ADMIN & SUPPLY	Occupancy HRS: 0700-1600	Occupancy Days: M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7212

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,490.19	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	107.47	
Sub Total	0.00	1,628.09	107.47	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	34.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,628.09</b>	<b>141.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212

BUILDING NAME: CO HQ BLDG

Building UA:	7,306	CONDITIONED SQFT:	19,320
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	9	7	7	7	7	7	10
REQ STOP:	13	21	21	21	21	21	19

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,660	3,360
HTG HRS ON:	2,656	5,376
H/C HRS ON:	4,328	8,760
CLG HRS SAVED:	1,700	
HTG HRS SAVED:	2,720	
C/H HRS SAVED:	4,432	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7212

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 16  
 System Name: Heating and Ventilating Unit  
 System Number: HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,229.77	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	107.47	
Sub Total	0.00	1,367.67	107.47	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	34.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,367.67</b>	<b>141.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212 BUILDING NAME: CO HQ BLDG  
Building UA: 7,306 CONDITIONED SQFT: 19,320

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7212

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,490.19	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	107.47	
<b>Sub Total</b>	<b>0.00</b>	<b>1,628.09</b>	<b>107.47</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	34.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,628.09</b>	<b>141.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7212****BUILDING NAME: CO HQ BLDG**

Building UA:	7,306	CONDITIONED SQFT:	19,320
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7212

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,490.19	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	107.47	
Sub Total	0.00	1,628.09	107.47	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	34.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,628.09</b>	<b>141.98</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7212

BUILDING NAME: CO HQ BLDG

Building UA:	7,306	CONDITIONED SQFT:	19,320
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	19	19	19	19	19	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,300	3,360
HTG HRS ON:	2,080	5,376
H/C HRS ON:	3,389	8,760
CLG HRS SAVED:	2,060	
HTG HRS SAVED:	3,296	
C/H HRS SAVED:	5,371	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7212****BUILDING NAME: CO HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

<b>FUNCTION</b>	<b>KW/yr</b>	<b>kWh/yr</b>	<b>MBtu/yr</b>	<b>MH/yr</b>
Schedule ST/SP	0.00	12,053.02	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	13,168.36	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,168.36</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

<b>UMCS FUNCTN NO.</b>	<b>UMCS APPLICATION</b>	<b>DO POINTS</b>	<b>AO POINTS</b>	<b>DI POINTS</b>	<b>AI POINTS</b>	<b>COST</b>
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**BUILDING 7215**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

**ENERGY CALCULATION PARAMETERS****BLDG: 7215****BUILDING NAME: BN HQ BLDG**

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	3,250
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

BLDG: 7215

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,949.09	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	18,289.05	0.00	
Sub Total	0.66	20,501.18	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	2,202.20	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.66</b>	<b>22,703.38</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

**ENERGY CALCULATION PARAMETERS**

BLDG: 7215

BUILDING NAME: BN HQ BLDG

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	258,000
BLR CAP OUTPUT (BTUH):	206,400

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

BLDG: 7215

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	1.46	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>1.46</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

**ENERGY CALCULATION PARAMETERS**

BLDG: 7215

BUILDING NAME: BN HQ BLDG

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	8
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

**BLDG: 7215****BUILDING NAME: BN HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	140.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	6.73	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>6.73</b>	<b>140.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: ajn/cww

**ENERGY CALCULATION PARAMETERS**

BLDG: 7215

BUILDING NAME: BN HQ BLDG

Building UA:	1,202	CONDITIONED SQFT:	2,604
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.08
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: ajn/cww

BLDG: 7215

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	269.75	0.00	
Opt ST/SP	0.00	22.75	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	292.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>292.51</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7218**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 7218

BUILDING NAME: BN HQ BLDG

Building UA:	3,007	CONDITIONED SQFT:	12,625
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	7,820
CFM-CLG:	7,820
%OA:	15%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/DEJ

BLDG: 7218

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	36,478.74	121.87	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	47,195.03	110.06	
Sub Total	10.99	85,316.59	231.93	
Economizer	0.00	1,458.75	0.00	
Ventilation/Recirculation	0.00	91.95	5.80	
DDC Control	0.00	4,275.33	90.51	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>91,142.62</b>	<b>328.24</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 7218

BUILDING NAME: BN HQ BLDG

Building UA:	3,007	CONDITIONED SQFT:	12,625
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	525,000
BLR CAP OUTPUT (BTUH):	420,000

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/DEJ

BLDG: 7218

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,559.10	0.00	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,834.89	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.98	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,834.89</b>	<b>2.98</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/DEJ

**ENERGY CALCULATION PARAMETERS**

BLDG: 7218

BUILDING NAME: BN HQ BLDG

Building UA:	3,007	CONDITIONED SQFT:	12,625
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUHC:	0.000941
NSUC:	0.00249
DDCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/DEJ

BLDG: 7218

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,121.57	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	2,384.61	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>25.90</b>	<b>2,909.61</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**BUILDING 7220**  
**CO HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 7220****BUILDING NAME: CO HQ BLDG****Building UA: 4,949****CONDITIONED SQFT: 18,870****SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	5.00
<b>HP Effic:</b>	0.82
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	1,327,500
<b>BLR CAP OUTPUT (BTUH):</b>	1,062,000

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,200	3,360
<b>HTG HRS ON:</b>	1,920	5,376
<b>H/C HRS ON:</b>	3,129	8,760
<b>CLG HRS SAVED:</b>	2,160	
<b>HTG HRS SAVED:</b>	3,456	
<b>C/H HRS SAVED:</b>	5,631	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000226
<b>NSUCC:</b>	0.000598
<b>DDCCHC:</b>	0.0000188
<b>DDCCC:</b>	0.0000498
<b>NSC:</b>	93100
<b>DDCH:</b>	29900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	12,638.12	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	13,753.46	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	7.53	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>13,753.46</b>	<b>7.53</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220

BUILDING NAME: CO HQ BLDG

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	65
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,895.27	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	5,586.50	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,137.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	54.70	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>56.43</b>	<b>6,724.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220	BUILDING NAME: CO HQ BLDG
Building UA: 4,949	CONDITIONED SQFT: 18,870

**SYSTEM INFORMATION**

System Type: 19
System Name: Fan coil unit
System Number: FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	7,200
%OA:	20%
%Area:	37%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,856.70	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	9,163.46	170.48	
Sub Total	0.00	14,283.20	170.48	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,283.20</b>	<b>170.48</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220

BUILDING NAME: CO HQ BLDG

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,562.53	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	72.80	
Sub Total	0.00	1,700.43	72.80	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,700.43</b>	<b>96.18</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220

BUILDING NAME: CO HQ BLDG

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,562.53	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	72.80	
Sub Total	0.00	1,700.43	72.80	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,700.43</b>	<b>96.18</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220

BUILDING NAME: CO HQ BLDG

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,562.53	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	72.80	
Sub Total	0.00	1,700.43	72.80	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,700.43</b>	<b>96.18</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 7220****BUILDING NAME: CO HQ BLDG**

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,562.53	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	72.80	
Sub Total	0.00	1,700.43	72.80	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,700.43</b>	<b>96.18</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 7220****BUILDING NAME: CO HQ BLDG**

<b>Building UA:</b>	<b>4,949</b>	<b>CONDITIONED SQFT:</b>	<b>18,870</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>26</b>
<b>System Name:</b>	<b>Pump</b>
<b>System Number:</b>	<b>HWP-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>3BRICK AND CMU</b>	<b>ADMIN &amp; SUPPLY</b>	<b>0700-1600</b>	<b>M-F</b>
<b>Weeks of Winter:</b>	<b>32</b>			
<b>Weeks of Summer:</b>	<b>20</b>			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	5	5	5	5	5	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	<b>3.00</b>
<b>HP Effic:</b>	<b>0.72</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>0%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0.000226</b>
<b>NSUCC:</b>	<b>0.000598</b>
<b>DDCCHC:</b>	<b>0.0000188</b>
<b>DDCCC:</b>	<b>0.0000498</b>
<b>NSC:</b>	<b>93100</b>
<b>DDCH:</b>	<b>29900</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,200</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,920</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>3,129</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,160</b>	
<b>HTG HRS SAVED:</b>	<b>3,456</b>	
<b>C/H HRS SAVED:</b>	<b>5,631</b>	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

BLDG: 7220

BUILDING NAME: CO HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 26  
System Name: Pump  
System Number: HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,654.02	0.00	
Opt ST/SP	0.00	763.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	9,417.75	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>9,417.75</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7220

BUILDING NAME: CO HQ BLDG

Building UA:	4,949	CONDITIONED SQFT:	18,870
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,200	3,360
HTG HRS ON:	1,920	5,376
H/C HRS ON:	3,129	8,760
CLG HRS SAVED:	2,160	
HTG HRS SAVED:	3,456	
C/H HRS SAVED:	5,631	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: DJ/AJN

**BLDG: 7220****BUILDING NAME: CO HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,832.43	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	8,523.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,523.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 7243**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7243****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,063,000
BLR CAP OUTPUT (BTUH):	850,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,414.42	0.00	
Opt ST/SP	0.00	275.79	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	3,690.21	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	6.03	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,690.21</b>	<b>6.03</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.35	1,204.90	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>1,204.90</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7243****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	23
System Name:	Ventilation fan
System Number:	EF-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	14,975
%OA:	100%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	23
System Name:	Ventilation fan
System Number:	EF-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,944.40	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	14,635.63	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	733.99	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,369.62</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
21	Scheduled start/stop control - Ventilation Fan; Optimum start/stop - Ventilation Fan; Night setback - Ventilation Fan	1	0	0	2	\$532.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>\$532.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7243****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	0%
%Area:	7%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,306.39	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	2,502.98	30.47	
Sub Total	0.00	8,072.42	30.47	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,072.42</b>	<b>30.47</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	H&V-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,144.09	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	56.59	
Sub Total	0.00	1,236.51	56.59	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.18	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,236.51</b>	<b>74.77</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7243****BUILDING NAME: ADMIN & SUPPORT BLDG**

<b>Building UA:</b>	<b>4,676</b>	<b>CONDITIONED SQFT:</b>	<b>17,829</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>25</b>
<b>System Name:</b>	<b>Hot water radiation pump</b>
<b>System Number:</b>	<b>RAD-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>3 BRICK AND CMU</b>	<b>ADMIN &amp; SUPPLY</b>	<b>0700-1600</b>	<b>M-F</b>
<b>Weeks of Winter:</b>	<b>32</b>			
<b>Weeks of Summer:</b>	<b>20</b>			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	<b>0.50</b>
<b>HP Effic:</b>	<b>0.66</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>0</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>0%</b>
<b>%Area:</b>	<b>78%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,000</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,600</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,607</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,360</b>	
<b>HTG HRS SAVED:</b>	<b>3,776</b>	
<b>C/H HRS SAVED:</b>	<b>6,153</b>	

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0.000226</b>
<b>NSUCC:</b>	<b>0.000598</b>
<b>DDCCHC:</b>	<b>0.0000188</b>
<b>DDCCC:</b>	<b>0.0000498</b>
<b>NSC:</b>	<b>93100</b>
<b>DDCH:</b>	<b>29900</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,845.11	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7243

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,676	CONDITIONED SQFT:	17,829
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.04
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	220
CFM-CLG:	0
%OA:	0%
%Area:	2%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7243****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	140.84	0.00	
Opt ST/SP	0.00	11.38	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	8.71	
Sub Total	0.00	152.22	8.71	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>152.22</b>	<b>8.71</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7245**  
**ENLISTED PERSONNEL DINING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS****BLDG: 7245****BUILDING NAME: ENL PERS DIN**

<b>Building UA:</b>	<b>2,545</b>	<b>CONDITIONED SQFT:</b>	<b>13,998</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>11</b>
<b>System Name:</b>	<b>Variable Air Volume air handling unit</b>
<b>System Number:</b>	<b>AHU-1</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>11</b>	<b>BRICK AND CMU</b>	<b>MESS HALL - DINING AREA</b>	<b>0600-2000</b>	<b>M-F; SAT-SUN</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>
<b>REQ STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>

**INPUTS**

<b>Motor HP:</b>	<b>5.00</b>
<b>HP Effic:</b>	<b>0.82</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>7,000</b>
<b>CFM-CLG:</b>	<b>7,000</b>
<b>%OA:</b>	<b>30%</b>
<b>%Area:</b>	<b>35%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**CONSTANTS**

<b>HOAUHC:</b>	<b>28.4</b>
<b>HOAUH:</b>	<b>45.6</b>
<b>COAUHC:</b>	<b>0.000623</b>
<b>COAUC:</b>	<b>0.00165</b>
<b>HOAOHC:</b>	<b>33.9</b>
<b>HOAOH:</b>	<b>54.4</b>
<b>COAOHC:</b>	<b>0.0006483</b>
<b>COAOC:</b>	<b>0.00171</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0.000208</b>
<b>ECHC:</b>	<b>0.0000788</b>
<b>NSUCHC:</b>	<b>0.000261</b>
<b>NSUCC:</b>	<b>0.000691</b>
<b>DDCCHC:</b>	<b>0.00018</b>
<b>DDCCC:</b>	<b>0.000476</b>
<b>NSC:</b>	<b>57200</b>
<b>DDCH:</b>	<b>22500</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>2,620</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>4,192</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>6,831</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>740</b>	
<b>HTG HRS SAVED:</b>	<b>1,184</b>	
<b>C/H HRS SAVED:</b>	<b>1,929</b>	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,579.22	115.06	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	3,524.80	50.95	
Sub Total	7.46	14,219.37	166.01	
Economizer	0.00	3,767.82	0.00	
Ventilation/Recirculation	0.00	399.03	18.19	
DDC Control	0.00	8,606.70	20.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>26,992.92</b>	<b>204.25</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245 BUILDING NAME: ENL PERS DIN  
Building UA: 2,545 CONDITIONED SQFT: 13,998

**SYSTEM INFORMATION**

System Type: 11  
System Name: Variable Air Volume air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
11 BRICK AND CMU MESS HALL - DINING AREA 0600-2000 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	7,250
CFM-CLG:	7,250
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	28.4
HOAUH:	45.6
COAUHC:	0.000623
COAUC:	0.00165
HOAOHC:	33.9
HOAOH:	54.4
COAOHC:	0.0006483
COAOC:	0.00171
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000208
ECHC:	0.0000788
NSUCHC:	0.000261
NSUCC:	0.000691
DDCCHC:	0.00018
DDCCC:	0.000476
NSC:	57200
DDCH:	22500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,669.36	119.17	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	3,650.69	50.95	
Sub Total	7.46	14,435.40	170.12	
Economizer	0.00	3,902.39	0.00	
Ventilation/Recirculation	0.00	413.28	18.84	
DDC Control	0.00	8,914.08	20.04	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>27,665.15</b>	<b>209.00</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245 BUILDING NAME: ENL PERS DIN  
Building UA: 2,545 CONDITIONED SQFT: 13,998

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
12 BRICK AND CMU MESS HALL - KITCHEN ARE 0500-2400 M-F; SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	66%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	7,071,000
BLR CAP OUTPUT (BTUH):	5,657,000

**COURSE LOADS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760

CLG HRS SAVED:	740
HTG HRS SAVED:	1,184
C/H HRS SAVED:	1,929

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245

BUILDING NAME: ENL PERS DIN

Building UA:	2,545	CONDITIONED SQFT:	13,998
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	66%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,000,000
BLR CAP OUTPUT (BTUH):	2,000,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type: 5  
System Name: Steam to hot water converter  
System Number: CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	11.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>11.34</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvrtr; Optimum start/stop control - STM-HW Cnvrtr; Night setback - STM-HW Cnvrtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245

BUILDING NAME: ENL PERS DIN

Building UA:	2,545	CONDITIONED SQFT:	13,998
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	CWP-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
11	BRICK AND CMU	MESS HALL - DINING AREA	0600-2000	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	5	5	5	5	5	0
REQ STOP:	0	20	20	20	20	20	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,500	3,360
HTG HRS ON:	2,400	5,376
H/C HRS ON:	3,911	8,760
CLG HRS SAVED:	1,860	
HTG HRS SAVED:	2,976	
C/H HRS SAVED:	4,849	

**CONSTANTS**

HOAUHC:	28.4
HOAUH:	45.6
COAUHC:	0.000623
COAUC:	0.00165
HOAOHC:	33.9
HOAOH:	54.4
COAOHC:	0.0006483
COAOC:	0.00171
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000208
ECHC:	0.0000788
NSUCHC:	0.000261
NSUCC:	0.000691
DDCCHC:	0.00018
DDCCC:	0.000476
NSC:	57200
DDCH:	22500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	CWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,801.76	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	7,917.11	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.80</b>	<b>7,917.11</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245 BUILDING NAME: ENL PERS DIN  
Building UA: 2,545 CONDITIONED SQFT: 13,998

**SYSTEM INFORMATION**

System Type: 17  
System Name: Heating and Ventilating Unit with Return Fa  
System Number: HRU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	8.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	11,400
CFM-CLG:	0
%OA:	100%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,927.56	0.00	
Opt ST/SP	0.00	1,784.55	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	151.48	
Sub Total	0.00	8,712.11	151.48	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	1.47	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,712.11</b>	<b>152.95</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>\$1,782.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

**ENERGY CALCULATION PARAMETERS**

BLDG: 7245

BUILDING NAME: ENL PERS DIN

Building UA:	2,545	CONDITIONED SQFT:	13,998
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**SYSTEM INFORMATION**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	4,600
CFM-CLG:	0
%OA:	100%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW/AJN

BLDG: 7245

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,472.22	0.00	
Opt ST/SP	0.00	1,152.05	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	75.74	
Sub Total	0.00	5,624.27	75.74	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.74	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,624.27</b>	<b>76.48</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>\$1,782.00</b>

**BUILDING 7264**  
**LIBRARY MAIN**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7264****BUILDING NAME: LIBRARY MAIN**

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	7,200
%OA:	20%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	25,169.66	209.13	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	10,952.00	22.62	
Sub Total	7.46	37,237.01	231.75	
Economizer	0.00	1,059.61	0.00	
Ventilation/Recirculation	0.00	0.00	9.27	
DDC Control	0.00	1,242.07	23.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>39,538.69</b>	<b>264.68</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	7,200
CFM-CLG:	7,200
%OA:	20%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	25,169.66	209.13	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	10,952.00	22.62	
Sub Total	7.46	37,237.01	231.75	
Economizer	0.00	1,059.61	0.00	
Ventilation/Recirculation	0.00	0.00	9.27	
DDC Control	0.00	1,242.07	23.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>39,538.69</b>	<b>264.68</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	7	7	7	7	7	11
REQ STOP:	22	22	22	22	22	22	22

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	6,916
CFM-CLG:	6,916
%OA:	20%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,940	3,360
HTG HRS ON:	3,104	5,376
H/C HRS ON:	5,058	8,760
CLG HRS SAVED:	1,420	
HTG HRS SAVED:	2,272	
C/H HRS SAVED:	3,702	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAHC:	17.3
HOAHC:	27.9
COAHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7264****BUILDING NAME: LIBRARY MAIN****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,538.23	108.05	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	5,658.49	22.62	
Sub Total	7.46	20,312.06	130.67	
Economizer	0.00	2,742.44	0.00	
Ventilation/Recirculation	0.00	0.00	8.90	
DDC Control	0.00	3,214.67	23.66	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>7.46</b>	<b>26,269.18</b>	<b>163.23</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7264****BUILDING NAME: LIBRARY MAIN**

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	13,650
CFM-CLG:	13,650
%OA:	15%
%Area:	41%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	37,073.01	297.35	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	20,763.17	54.56	
Sub Total	10.99	59,478.99	351.91	
Economizer	0.00	2,008.84	0.00	
Ventilation/Recirculation	0.00	0.00	13.18	
DDC Control	0.00	2,354.75	57.06	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>10.99</b>	<b>63,842.59</b>	<b>422.15</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	16	16	16	16	16	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,200
CFM-CLG:	1,200
%OA:	15%
%Area:	8%
CHILLER CAP (TON):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,899.71	24.36	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	1,700.88	10.65	
Sub Total	0.92	4,738.49	35.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	258.76	11.13	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>4,997.25</b>	<b>46.14</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA: 4,363

CONDITIONED SQFT: 31,240

**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	11	7	7	7	7	7	11
REQ STOP:	22	22	22	22	22	22	22

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,691,000
BLR CAP OUTPUT (BTUH):	2,953,000

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,940	3,360
HTG HRS ON:	3,104	5,376
H/C HRS ON:	5,058	8,760
CLG HRS SAVED:	1,420	
HTG HRS SAVED:	2,272	
C/H HRS SAVED:	3,702	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	60
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	18,363.08	0.00	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	5.32	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	5.32	20,484.57	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,050.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	50.49	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>55.81</b>	<b>21,534.57</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264 BUILDING NAME: LIBRARY MAIN  
Building UA: 4,363 CONDITIONED SQFT: 31,240

**SYSTEM INFORMATION**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: CH-2

**TYPICAL BUILDING INFORMATION**

Category Number: 21 Construction: BRICK AND CMU Use: TRAINING Occupancy HRS: 0700-2100 Occupancy Days: M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	5
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	87.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	4.21	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>4.21</b>	<b>87.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

Building UA:	4,363	CONDITIONED SQFT:	31,240
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	13	0	11	0	11	9	9
REQ STOP:	17	0	19	0	19	17	17

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	720	3,360
HTG HRS ON:	1,152	5,376
H/C HRS ON:	1,877	8,760
CLG HRS SAVED:	2,640	
HTG HRS SAVED:	4,224	
C/H HRS SAVED:	6,883	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7264

BUILDING NAME: LIBRARY MAIN

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 7270**  
**BN HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7270****BUILDING NAME: BN HQ BLDG**

Building UA:	2,347	CONDITIONED SQFT:	6,130
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	7	6	0
REQ STOP:	0	17	17	17	16	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	6,310
CFM-CLG:	6,310
%OA:	40%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/CWW

BLDG: 7270

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 10  
 System Name: Multizone air handling unit  
 System Number: AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	17,479.57	245.19	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	35,605.05	85.90	
<b>Sub Total</b>	<b>4.62</b>	<b>53,775.86</b>	<b>331.09</b>	
Economizer	0.00	1,386.33	0.00	
Ventilation/Recirculation	0.00	197.84	12.47	
DDC Control	0.00	4,063.09	70.64	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>59,423.12</b>	<b>414.20</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7270

BUILDING NAME: BN HQ BLDG

Building UA:	2,347	CONDITIONED SQFT:	6,130
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	7	6	0
REQ STOP:	0	17	17	17	16	17	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	450,000
BLR CAP OUTPUT (BTUH):	360,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/CWW

BLDG: 7270

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,495.71	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,702.55	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.55	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,702.55</b>	<b>2.55</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7270****BUILDING NAME: BN HQ BLDG**

Building UA:	2,347	CONDITIONED SQFT:	6,130
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	7	6	0
REQ STOP:	0	17	17	17	16	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	25
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

BLDG: 7270

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	437.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	21.04	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>21.04</b>	<b>437.50</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7270

BUILDING NAME: BN HQ BLDG

Building UA:	2,347	CONDITIONED SQFT:	6,130
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F; SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	7	6	0
REQ STOP:	0	17	17	17	16	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,060	3,360
HTG HRS ON:	1,696	5,376
H/C HRS ON:	2,764	8,760
CLG HRS SAVED:	2,300	
HTG HRS SAVED:	3,680	
C/H HRS SAVED:	5,996	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/CWW

BLDG: 7270

BUILDING NAME: BN HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 7285  
CLOTHING SALES**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7285****BUILDING NAME: CLOTHING SALES**

Building UA:	4,894	CONDITIONED SQFT:	17,042
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	17/BRICK AND CMU	RETAIL SHOP	0800-2200	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	11	9	10
REQ STOP:	0	18	18	18	19	18	16

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	18,700
CFM-CLG:	18,700
%OA:	10%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7285

BUILDING NAME: CLOTHING SALES

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	35,821.88	200.20	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	52,351.58	1,942.92	
Sub Total	0.00	89,816.28	2,143.12	
Economizer	0.00	14,626.07	0.00	
Ventilation/Recirculation	0.00	132.89	9.92	
DDC Control	0.00	12,090.89	1,013.06	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>116,666.13</b>	<b>3,166.10</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7285

BUILDING NAME: CLOTHING SALES

Building UA:	4,894	CONDITIONED SQFT:	17,042
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	11	9	10
REQ STOP:	0	18	18	18	19	18	16

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,000,000
BLR CAP OUTPUT (BTUH):	1,600,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUHC:	0.000455
NSUCC:	0.0012
DDCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7285

BUILDING NAME: CLOTHING SALES

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,580.36	0.00	
Opt ST/SP	0.00	208.42	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,788.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	11.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,788.79</b>	<b>11.34</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7285

BUILDING NAME: CLOTHING SALES

Building UA:	4,894	CONDITIONED SQFT:	17,042
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**SYSTEM INFORMATION**

System Type:	9
System Name:	Water cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
17	BRICK AND CMU	RETAIL SHOP	0800-2200	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	11	9	10
REQ STOP:	0	18	18	18	19	18	16

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	40
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	17.4
HOAUH:	28
COAUHC:	0.000233
COAUC:	0.000615
HOAOHC:	36.7
HOAOH:	59.1
COAOHC:	0.00124
COAOC:	0.00328
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000795
ECHC:	0.0003
NSUCHC:	0.000455
NSUCC:	0.0012
DDCCHC:	0.000248
DDCCC:	0.000657
NSC:	397000
DDCH:	207000
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7285

BUILDING NAME: CLOTHING SALES

**ENERGY CALCULATION SUMMARY**

System Type:	9
System Name:	Water cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	12,711.62	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	14,354.44	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	700.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	33.66	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				11.00
<b>TOTAL</b>	<b>37.78</b>	<b>15,054.44</b>	<b>0.00</b>	<b>11.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
13	Chilled water reset and alarms - Water Cooled Chiller	1	1	1	7	\$3,527.00
14	Condenser water reset and alarms - Water Cooled Chiller	0	1	0	2	\$936.00
15	Chiller demand limiting - Water Cooled Chiller	2	1	1	2	\$1,545.00
<b>TOTAL:</b>		<b>4</b>	<b>3</b>	<b>3</b>	<b>11</b>	<b>\$6,394.00</b>

**BUILDING 7305**  
**APP INSTRUCTION BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7305****BUILDING NAME: APP INSTR BLDG**

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DCCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**BLDG: 7305****BUILDING NAME: APP INSTR BLDG****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7305****BUILDING NAME: APP INSTR BLDG**

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	4
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**BLDG: 7305****BUILDING NAME: APP INSTR BLDG****ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-3

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	70.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	3.37	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.37</b>	<b>70.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	ACCU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	3
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 8  
System Name: Air cooled DX compressor  
System Number: ACCU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	47.25	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	2.27	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>2.27</b>	<b>47.25</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	30%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,310.34	58.22	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	2,032.76	22.50	
Sub Total	0.92	4,480.99	80.72	
Economizer	0.00	515.09	0.00	
Ventilation/Recirculation	0.00	0.00	3.48	
DDC Control	0.00	603.78	23.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>5,599.87</b>	<b>107.73</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	30%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/AMS/CWW

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,310.34	58.22	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	2,032.76	22.50	
Sub Total	0.92	4,480.99	80.72	
Economizer	0.00	515.09	0.00	
Ventilation/Recirculation	0.00	0.00	3.48	
DDC Control	0.00	603.78	23.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>5,599.87</b>	<b>107.73</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	1,800
%OA:	30%
%Area:	22%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/AMS/CWW

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,310.34	58.22	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	2,032.76	22.50	
Sub Total	0.92	4,480.99	80.72	
Economizer	0.00	515.09	0.00	
Ventilation/Recirculation	0.00	0.00	3.48	
DDC Control	0.00	603.78	23.53	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>5,599.87</b>	<b>107.73</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7305

BUILDING NAME: APP INSTR BLDG

Building UA:	3,353	CONDITIONED SQFT:	9,872
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	22	22	22	22	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,200
CFM-CLG:	1,200
%OA:	15%
%Area:	12%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,400	3,360
HTG HRS ON:	2,240	5,376
H/C HRS ON:	3,650	8,760
CLG HRS SAVED:	1,960	
HTG HRS SAVED:	3,136	
C/H HRS SAVED:	5,110	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/AMS/CWW

**BLDG: 7305****BUILDING NAME: APP INSTR BLDG****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,310.34	19.41	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	1,355.17	12.27	
Sub Total	0.92	3,803.41	31.68	
Economizer	0.00	343.39	0.00	
Ventilation/Recirculation	0.00	0.00	1.16	
DDC Control	0.00	402.52	12.84	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>4,549.32</b>	<b>45.67</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**BUILDING 7350**  
**VEHICLE MAINTENANCE SHOP ORG**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,600
CFM-CLG:	0
%OA:	15%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	43.76	
Sub Total	0.00	1,845.11	43.76	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.84	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>62.60</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	15%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	52.51	
<b>Sub Total</b>	<b>0.00</b>	<b>1,845.11</b>	<b>52.51</b>	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	22.61	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>75.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350 BUILDING NAME: VEH MNT SHOP ORG  
Building UA: 9,281 CONDITIONED SQFT: 21,345

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	15%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	52.51	
Sub Total	0.00	1,845.11	52.51	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	22.61	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>75.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	15%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	52.51	
Sub Total	0.00	1,845.11	52.51	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	22.61	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>75.12</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG**

<b>Building UA:</b>	<b>9,281</b>	<b>CONDITIONED SQFT:</b>	<b>21,345</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>15</b>
<b>System Name:</b>	<b>Small Single Zone air handling unit</b>
<b>System Number:</b>	<b>AHU-5</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	<b>13 METAL PANEL AND CMU</b>	<b>VEH MAINT SHOP</b>	<b>0700-1800</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	<b>0.50</b>
<b>HP Effic:</b>	<b>0.66</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>2,200</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>15%</b>
<b>%Area:</b>	<b>7%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>1,000</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,600</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,607</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,360</b>	
<b>HTG HRS SAVED:</b>	<b>3,776</b>	
<b>C/H HRS SAVED:</b>	<b>6,153</b>	

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUCHC:</b>	<b>0.000105</b>
<b>NSUCC:</b>	<b>0.000278</b>
<b>DDCCHC:</b>	<b>0.000161</b>
<b>DDCCC:</b>	<b>0.000426</b>
<b>NSC:</b>	<b>94300</b>
<b>DDCH:</b>	<b>40600</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	61.26	
Sub Total	0.00	1,845.11	61.26	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	26.38	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>87.64</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CVWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	4,600
CFM-CLG:	0
%OA:	15%
%Area:	15%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,567.94	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	131.28	
Sub Total	0.00	4,936.91	131.28	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	56.52	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,936.91</b>	<b>187.80</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	14 METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,778.25	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,244.98	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	30.07	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,244.98</b>	<b>30.07</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA: 9,281

CONDITIONED SQFT: 21,345

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	15%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,778.25	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,244.98	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	30.07	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,244.98</b>	<b>30.07</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-3

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	12,200
CFM-CLG:	0
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	20,338.60	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	21,981.42	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	60.14	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>21,981.42</b>	<b>60.14</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,707.21	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	210.05	
Sub Total	0.00	1,845.11	210.05	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,845.11</b>	<b>210.05</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7350

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,281	CONDITIONED SQFT:	21,345
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**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7350****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,144.09	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	140.03	
Sub Total	0.00	1,236.51	140.03	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,236.51</b>	<b>140.03</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7404**  
**ENLISTED BARRACKS W/O DINING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	29,135
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJNCWW

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	14,390.36	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.12</b>	<b>14,390.36</b>	<b>0.00</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	28,225
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAHC:	0
HOAH:	0
COAHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0
NSUC:	0
DDCHC:	0.0000556
DDCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJNCWW

**BLDG: 7404****BUILDING NAME: ENL BARRACKS W/O DIN****ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	13,940.89	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.12</b>	<b>13,940.89</b>	<b>0.00</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,210,000
BLR CAP OUTPUT (BTUH):	2,568,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**BLDG: 7404****BUILDING NAME: ENL BARRACKS W/O DIN****ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	18.20	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>18.20</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 09-Dec-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5/BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	813,000
BLR CAP OUTPUT (BTUH):	650,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJNCWW

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7404

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	4.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**BLDG: 7404****BUILDING NAME: ENL BARRACKS W/O DIN****ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	933.46	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	933.46	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>933.46</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7404****BUILDING NAME: ENL BARRACKS W/O DIN**

Building UA:	18,554	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	4 SANDSTONE BLOCK	ADMINISTRATION	0700-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	27.8
HOAUH:	44.6
COAUHC:	0
COAUC:	0
HOAOHC:	40.4
HOAOH:	65
COAOHC:	0.000877
COAOC:	0.00232
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.0000629
ECHC:	0.0000238
NSUCHC:	0.000609
NSUCC:	0.00161
DDCCHC:	0.000411
DDCCC:	0.00109
NSC:	131000
DDCH:	43100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJNCWW

**BLDG: 7404****BUILDING NAME: ENL BARRACKS W/O DIN****ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	466.73	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>466.73</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7410**  
**BN ADMINISTRATION & CLASSROOMS**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7410****BUILDING NAME: BN ADMIN & CLRM**

Building UA:	3,001	CONDITIONED SQFT:	12,599
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
7	BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	8	8	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	6,150
CFM-CLG:	6,150
%OA:	20%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: CWW

BLDG: 7410

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	36,572.70	127.80	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	10.99	0.00	0.00	
Night Setback	0.00	37,116.30	109.84	
Sub Total	10.99	75,331.81	237.63	
Economizer	0.00	1,147.23	0.00	
Ventilation/Recirculation	0.00	96.41	6.08	
DDC Control	0.00	3,362.31	90.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>10.99</b>	<b>79,937.77</b>	<b>334.04</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7410 BUILDING NAME: BN ADMIN & CLRM  
Building UA: 3,001 CONDITIONED SQFT: 12,599

**SYSTEM INFORMATION**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
7 BRICK AND CMU BATTALION 0700-1800 M-F, SAT

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	450,000
BLR CAP OUTPUT (BTUH):	360,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: CWW

BLDG: 7410

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	413.69	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	413.69	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.55	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>413.69</b>	<b>2.55</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7410

BUILDING NAME: BN ADMIN &amp; CLRM

Building UA: 3,001

CONDITIONED SQFT: 12,599

**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7 BRICK AND CMU	BATTALION	0700-1800	M-F, SAT

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	8	8	8	8	8	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	900	3,360
HTG HRS ON:	1,440	5,376
H/C HRS ON:	2,346	8,760
CLG HRS SAVED:	2,460	
HTG HRS SAVED:	3,936	
C/H HRS SAVED:	6,414	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: CWW

BLDG: 7410

BUILDING NAME: BN ADMIN &amp; CLRM

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,975.94	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.93	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.93	3,344.90	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	525.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.25	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>26.17</b>	<b>3,869.90</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>



**BUILDING 7424**  
**ENLISTED BARRACKS W/O DINING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN**

<b>Building UA:</b>	<b>15,693</b>	<b>CONDITIONED SQFT:</b>	<b>50,967</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	10
<b>System Name:</b>	Multizone air handling unit
<b>System Number:</b>	AHU-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
5	BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	0	0	0	0	0	0
<b>REQ STOP:</b>	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	7.50
<b>HP Effic:</b>	0.83
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	29,135
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000556
<b>DDCCC:</b>	0.000147
<b>NSC:</b>	20000
<b>DDCH:</b>	33900
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	14,390.36	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.12</b>	<b>14,390.36</b>	<b>0.00</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN**

<b>Building UA:</b>	15,693	<b>CONDITIONED SQFT:</b>	50,967
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**SYSTEM INFORMATION**

<b>System Type:</b>	10
<b>System Name:</b>	Multizone air handling unit
<b>System Number:</b>	AHU-2

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

<b>Motor HP:</b>	7.50
<b>HP Effic:</b>	0.83
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	28,225
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	3,360	3,360
<b>HTG HRS ON:</b>	5,376	5,376
<b>H/C HRS ON:</b>	8,760	8,760
<b>CLG HRS SAVED:</b>	0	
<b>HTG HRS SAVED:</b>	0	
<b>C/H HRS SAVED:</b>	0	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0
<b>NSUCC:</b>	0
<b>DDCCHC:</b>	0.0000556
<b>DDCCC:</b>	0.000147
<b>NSC:</b>	20000
<b>DDCH:</b>	33900
<b>OPT:</b>	0
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.12	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	4.12	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	13,940.89	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.12</b>	<b>13,940.89</b>	<b>0.00</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

# EMC ENGINEERS, INC.

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

## ENERGY CALCULATION PARAMETERS

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

Building UA:	15,693	CONDITIONED SQFT:	50,967
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### SYSTEM INFORMATION

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

### TYPICAL BUILDING INFORMATION

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
5	BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

### SYSTEM OPERATING SCHEDULE

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

### INPUTS

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	3,050,000
BLR CAP OUTPUT (BTUH):	2,140,000

### HOURS CALCULATIONS

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

### CONSTANTS

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN**

Building UA:	15,693	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	813,000
BLR CAP OUTPUT (BTUH):	650,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.61	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>4.61</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN**

Building UA:	15,693	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	50%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7424****BUILDING NAME: ENL BARRACKS W/O DIN**

Building UA:	15,693	CONDITIONED SQFT:	50,967
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**SYSTEM INFORMATION**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	5 BRICK AND CMU	BARRACKS	0000-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000556
DDCCC:	0.000147
NSC:	20000
DDCH:	33900
OPT:	0
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7424

BUILDING NAME: ENL BARRACKS W/O DIN

**ENERGY CALCULATION SUMMARY**

System Type:	25
System Name:	Hot water radiation pump
System Number:	RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7432**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7432****BUILDING NAME: ADMIN & SUPPORT BLDG****Building UA:** 4,746**CONDITIONED SQFT:** 13,500**SYSTEM INFORMATION**

<b>System Type:</b>	1
<b>System Name:</b>	Small hot water boiler
<b>System Number:</b>	BLR-1

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
3	BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	5.00
<b>HP Effic:</b>	0.82
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	1,119,000
<b>BLR CAP OUTPUT (BTUH):</b>	895,000

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,000	3,360
<b>HTG HRS ON:</b>	1,600	5,376
<b>H/C HRS ON:</b>	2,607	8,760
<b>CLG HRS SAVED:</b>	2,360	
<b>HTG HRS SAVED:</b>	3,776	
<b>C/H HRS SAVED:</b>	6,153	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000226
<b>NSUCC:</b>	0.000598
<b>DDCCHC:</b>	0.0000188
<b>DDCCC:</b>	0.0000498
<b>NSC:</b>	93100
<b>DDCH:</b>	29900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	13,808.31	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	14,923.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	6.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>14,923.66</b>	<b>6.34</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,746	CONDITIONED SQFT:	13,500
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	20
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	5,348.54	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.73	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.73	6,039.77	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	350.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	16.83	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>18.56</b>	<b>6,389.77</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,746	CONDITIONED SQFT:	13,500
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	12,000
CFM-CLG:	12,000
%OA:	20%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7432****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,415.45	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	16,686.55	154.65	
Sub Total	0.00	26,568.73	154.65	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>26,568.73</b>	<b>154.65</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,746 CONDITIONED SQFT: 13,500

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	57.44	
Sub Total	0.00	3,519.57	57.44	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>75.89</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,746 CONDITIONED SQFT: 13,500

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-2

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	57.44	
Sub Total	0.00	3,519.57	57.44	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>75.89</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,746	CONDITIONED SQFT:	13,500
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	57.44	
Sub Total	0.00	3,519.57	57.44	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>75.89</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7432****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	4,746	CONDITIONED SQFT:	13,500
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3/BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7432

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	57.44	
Sub Total	0.00	3,519.57	57.44	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>75.89</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7432 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,746 CONDITIONED SQFT: 13,500

**SYSTEM INFORMATION**

System Type: 16  
System Name: Heating and Ventilating Unit  
System Number: HV-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,400
CFM-CLG:	0
%OA:	100%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7432****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	HV-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,256.53	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	57.44	
Sub Total	0.00	3,519.57	57.44	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	18.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,519.57</b>	<b>75.89</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**BUILDING 7450**  
**REGIMENTAL HQ BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7450

BUILDING NAME: REGIMENTAL HQ BLDG

Building UA:	2,563	CONDITIONED SQFT:	9,850
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	7/BRICK AND CMU	BATTALION	0700-1800	M-F, SAT
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	825
CFM-CLG:	825
%OA:	100%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	16.2
HOAUH:	26.1
COAUHC:	0.000257
COAUC:	0.00068
HOAOHC:	33.3
HOAOH:	53.5
COAOHC:	0.00115
COAOC:	0.00305
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.00021
ECHC:	0.0000795
NSUCHC:	0.000941
NSUCC:	0.00249
DDCCHC:	0.000233
DDCCC:	0.000616
NSC:	36600
DDCH:	30100
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,913.24	78.75	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.92	0.00	0.00	
Night Setback	0.00	4,574.22	9.38	
Sub Total	0.92	8,625.36	88.13	
Economizer	0.00	188.10	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	551.27	7.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.92</b>	<b>9,364.73</b>	<b>95.84</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7450

BUILDING NAME: REGIMENTAL HQ BLDG

Building UA:	2,563	CONDITIONED SQFT:	9,850
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	450,000
BLR CAP OUTPUT (BTUH):	360,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7450

BUILDING NAME: REGIMENTAL HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,634.87	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,772.77	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	2.55	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,772.77</b>	<b>2.55</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG**

Building UA:	2,563	CONDITIONED SQFT:	9,850
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2 BRICK AND CMU	ADMINISTRATION	0600-1700	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	30
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,264.51	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	9,379.85	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	521.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	25.08	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>27.87</b>	<b>9,901.35</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG**

Building UA:	2,563	CONDITIONED SQFT:	9,850
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**SYSTEM INFORMATION**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	1.70
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	8,600
CFM-CLG:	8,600
%OA:	0%
%Area:	80%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7450

BUILDING NAME: REGIMENTAL HQ BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	19
System Name:	Fan coil unit
System Number:	FC-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	9,340.52	0.00	
Opt ST/SP	0.00	483.50	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	8,918.35	22.35	
Sub Total	0.00	18,742.37	22.35	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>18,742.37</b>	<b>22.35</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG**

Building UA:	2,563	CONDITIONED SQFT:	9,850
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**SYSTEM INFORMATION**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	2BRICK AND CMU	ADMINISTRATION	0600-1700	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000176
NSUCC:	0.000467
DDCCHC:	0.000111
DDCCC:	0.000294
NSC:	10900
DDCH:	32500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7450****BUILDING NAME: REGIMENTAL HQ BLDG****ENERGY CALCULATION SUMMARY**

System Type:	27
System Name:	Perimeter radiation valve
System Number:	RAD-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
25	Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Rad Valve	0	1	0	1	\$456.00
<b>TOTAL:</b>		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>\$456.00</b>

**BUILDING 7485  
BOWLING ALLEY**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7485****BUILDING NAME: BOWLING ALLEY**

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	18
System Name:	Dual Duct air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
19	BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	20.00
HP Effic:	0.88
Load Factor:	0.80
CFM-HTG:	16,000
CFM-CLG:	16,000
%OA:	20%
%Area:	46%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

**ENERGY CALCULATION SUMMARY**

System Type:	18
System Name:	Dual Duct air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	83,812.41	416.74	
Opt ST/SP	0.00	4,132.21	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	27.64	0.00	0.00	
Night Setback	0.00	93,346.56	168.22	
Sub Total	27.64	181,291.19	584.96	
Economizer	0.00	1,340.86	0.00	
Ventilation/Recirculation	0.00	244.98	21.76	
DDC Control	0.00	6,867.84	175.18	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>27.64</b>	<b>189,744.87</b>	<b>781.90</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
28	Direct digital control - Dual Duct AHU	1	7	0	9	\$3,761.00
34	Outside air damper ventilation and recirculation control - Dual Duct AHU	0	1	0	0	\$272.00
37	Outside air damper economizer control - Dual Duct AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>3</b>	<b>8</b>	<b>1</b>	<b>13</b>	<b>\$5,241.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	19 BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	10.00
HP Effic:	0.86
Load Factor:	0.80
CFM-HTG:	10,000
CFM-CLG:	10,000
%OA:	10%
%Area:	46%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW/AMS

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	42,087.19	130.23	
Opt ST/SP	0.00	2,121.49	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	14.19	0.00	0.00	
Night Setback	0.00	58,341.60	168.22	
Sub Total	14.19	102,550.28	298.45	
Economizer	0.00	838.04	0.00	
Ventilation/Recirculation	0.00	76.55	6.80	
DDC Control	0.00	4,292.40	175.18	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>14.19</b>	<b>107,757.28</b>	<b>480.43</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7485****BUILDING NAME: BOWLING ALLEY**

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	19 BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,000,000
BLR CAP OUTPUT (BTUH):	1,600,000

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7485****BUILDING NAME: BOWLING ALLEY****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	8,122.52	0.00	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	8,813.75	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	11.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,813.75</b>	<b>11.34</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7485****BUILDING NAME: BOWLING ALLEY**

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
19	BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	60
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7485****BUILDING NAME: BOWLING ALLEY****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,050.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	50.49	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>50.49</b>	<b>1,050.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	19 BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	0.00
HP Effic:	0.64
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	28
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7485****BUILDING NAME: BOWLING ALLEY****ENERGY CALCULATION SUMMARY**

System Type:	8
System Name:	Air cooled DX compressor
System Number:	CH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	490.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	23.56	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>23.56</b>	<b>490.00</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
17	Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor; Demand limiting - DX Compressor	1	0	1	0	\$243.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$243.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7485****BUILDING NAME: BOWLING ALLEY**

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
19	BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	2,200
CFM-CLG:	0
%OA:	0%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**BLDG: 7485****BUILDING NAME: BOWLING ALLEY****ENERGY CALCULATION SUMMARY**

System Type: 21  
System Name: HW Unit heater  
System Number: UH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	822.67	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	14.63	
Sub Total	0.00	892.68	14.63	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>892.68</b>	<b>14.63</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

Building UA:	6,305	CONDITIONED SQFT:	36,966
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**SYSTEM INFORMATION**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
19	BRICK AND CMU	BOWLING ALLEY	0800-2400	M-F; SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	12	9	9	9	9	9	9
REQ STOP:	22	24	24	24	24	2	2

**INPUTS**

Motor HP:	0.25
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	1,630
CFM-CLG:	0
%OA:	0%
%Area:	4%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,120	3,360
HTG HRS ON:	1,792	5,376
H/C HRS ON:	2,920	8,760
CLG HRS SAVED:	2,240	
HTG HRS SAVED:	3,584	
C/H HRS SAVED:	5,840	

**CONSTANTS**

HOAUHC:	22.3
HOAUH:	35.8
COAUHC:	0.000251
COAUC:	0.000665
HOAOHC:	25.5
HOAOH:	41
COAOHC:	0.000793
COAOC:	0.0021
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000076
ECHC:	0.0000287
NSUCHC:	0.000999
NSUCC:	0.00264
DDCCHC:	0.000147
DDCCC:	0.000389
NSC:	58000
DDCH:	60400
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW/AMS

BLDG: 7485

BUILDING NAME: BOWLING ALLEY

**ENERGY CALCULATION SUMMARY**

System Type:	21
System Name:	HW Unit heater
System Number:	UH-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	822.67	0.00	
Opt ST/SP	0.00	70.01	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	14.63	
Sub Total	0.00	892.68	14.63	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>892.68</b>	<b>14.63</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>



**BUILDING 7500  
VEHICLE MAINTENANCE SHOP ORG**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,600
CFM-CLG:	0
%OA:	15%
%Area:	7%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,422.11	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	64.08	
Sub Total	0.00	3,685.15	64.08	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	27.59	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,685.15</b>	<b>91.66</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500 BUILDING NAME: VEH MNT SHOP ORG  
Building UA: 9,707 CONDITIONED SQFT: 22,325

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
13 METAL PANEL AND CMU VEH MAINT SHOP 0700-1800 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	15%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	45.77	
Sub Total	0.00	1,931.91	45.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	19.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>65.47</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	15%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	45.77	
Sub Total	0.00	1,931.91	45.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	19.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>65.47</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG**

<b>Building UA:</b>	9,707	<b>CONDITIONED SQFT:</b>	22,325
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**SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-4

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	9	9	9	7	9	0
<b>REQ STOP:</b>	0	18	18	18	15	18	0

**INPUTS**

<b>Motor HP:</b>	0.50
<b>HP Effic:</b>	0.66
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,800
<b>CFM-CLG:</b>	0
<b>%OA:</b>	15%
<b>%Area:</b>	5%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	880	3,360
<b>HTG HRS ON:</b>	1,408	5,376
<b>H/C HRS ON:</b>	2,294	8,760
<b>CLG HRS SAVED:</b>	2,480	
<b>HTG HRS SAVED:</b>	3,968	
<b>C/H HRS SAVED:</b>	6,466	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000105
<b>NSUCC:</b>	0.000278
<b>DDCCHC:</b>	0.000161
<b>DDCCC:</b>	0.000426
<b>NSC:</b>	94300
<b>DDCH:</b>	40600
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	45.77	
Sub Total	0.00	1,931.91	45.77	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	19.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>65.47</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500 BUILDING NAME: VEH MNT SHOP ORG  
 Building UA: 9,707 CONDITIONED SQFT: 22,325

**SYSTEM INFORMATION**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,200
CFM-CLG:	0
%OA:	15%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	54.92	
Sub Total	0.00	1,931.91	54.92	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.65	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>78.57</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500 BUILDING NAME: VEH MNT SHOP ORG  
Building UA: 9,707 CONDITIONED SQFT: 22,325

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	4,600
CFM-CLG:	0
%OA:	15%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,800.21	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	119.00	
Sub Total	0.00	5,169.18	119.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	51.23	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,169.18</b>	<b>170.23</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,072.06	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,538.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	31.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,538.79</b>	<b>31.45</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,072.06	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,538.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	31.45	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,538.79</b>	<b>31.45</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	7.50
HP Effic:	0.83
Load Factor:	0.80
CFM-HTG:	12,200
CFM-CLG:	0
%OA:	100%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	21,372.77	0.00	
Opt ST/SP	0.00	1,642.82	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	23,015.58	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	62.90	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>23,015.58</b>	<b>62.90</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA: 9,707

CONDITIONED SQFT: 22,325

**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	219.69	
Sub Total	0.00	1,931.91	219.69	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>219.69</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7500

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	9,707	CONDITIONED SQFT:	22,325
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**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JM/AJN/AMS

**BLDG: 7500****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,202.27	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	146.46	
Sub Total	0.00	1,294.68	146.46	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,294.68</b>	<b>146.46</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7520**  
**VEHICLE MAINTENANCE SHOP ORG**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

Building UA: 11,789

CONDITIONED SQFT: 27,112

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	1.00
HP Effic:	0.69
Load Factor:	0.80
CFM-HTG:	2,600
CFM-CLG:	0
%OA:	30%
%Area:	7%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	3,422.11	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	77.82	
Sub Total	0.00	3,685.15	77.82	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	33.50	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,685.15</b>	<b>111.32</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	30%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	55.59	
Sub Total	0.00	1,931.91	55.59	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.93	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>79.52</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	1,800
CFM-CLG:	0
%OA:	30%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	55.59	
Sub Total	0.00	1,931.91	55.59	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.93	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>79.52</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

<b>Building UA:</b>	11,789	<b>CONDITIONED SQFT:</b>	27,112
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**SYSTEM INFORMATION**

<b>System Type:</b>	15
<b>System Name:</b>	Small Single Zone air handling unit
<b>System Number:</b>	AHU-4

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

<b>Weeks of Winter:</b>	32
<b>Weeks of Summer:</b>	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	9	9	9	7	9	0
<b>REQ STOP:</b>	0	18	18	18	15	18	0

**INPUTS**

<b>Motor HP:</b>	0.50
<b>HP Effic:</b>	0.66
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	1,800
<b>CFM-CLG:</b>	0
<b>%OA:</b>	30%
<b>%Area:</b>	5%
<b>CHILLER CAP (TONS):</b>	0
<b>KW-TON:</b>	0.00
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	880	3,360
<b>HTG HRS ON:</b>	1,408	5,376
<b>H/C HRS ON:</b>	2,294	8,760
<b>CLG HRS SAVED:</b>	2,480	
<b>HTG HRS SAVED:</b>	3,968	
<b>C/H HRS SAVED:</b>	6,466	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000105
<b>NSUCC:</b>	0.000278
<b>DDCCHC:</b>	0.000161
<b>DDCCC:</b>	0.000426
<b>NSC:</b>	94300
<b>DDCH:</b>	40600
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	55.59	
Sub Total	0.00	1,931.91	55.59	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	23.93	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>79.52</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	2,200
CFM-CLG:	0
%OA:	30%
%Area:	6%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	66.70	
Sub Total	0.00	1,931.91	66.70	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	28.72	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>95.42</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	13METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	1.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	4,600
CFM-CLG:	0
%OA:	30%
%Area:	13%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-6

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,800.21	0.00	
Opt ST/SP	0.00	368.97	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	144.52	
Sub Total	0.00	5,169.18	144.52	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	62.22	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,169.18</b>	<b>206.74</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,072.06	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,538.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	38.20	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,538.79</b>	<b>38.20</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

Building UA: 11,789

CONDITIONED SQFT: 27,112

**SYSTEM INFORMATION**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
14	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	4,120
CFM-CLG:	0
%OA:	100%
%Area:	5%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.0000199
DDCCC:	0.0000526
NSC:	0
DDCH:	64800
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,072.06	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	6,538.79	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	38.20	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>6,538.79</b>	<b>38.20</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

<b>Building UA:</b>	<b>11,789</b>	<b>CONDITIONED SQFT:</b>	<b>27,112</b>
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**SYSTEM INFORMATION**

<b>System Type:</b>	<b>16</b>
<b>System Name:</b>	<b>Heating and Ventilating Unit</b>
<b>System Number:</b>	<b>MAU-3</b>

**TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
<b>14</b>	<b>METAL PANEL AND CMU</b>	<b>VEH MAINT SHOP</b>	<b>0700-1800</b>	<b>M-F</b>

<b>Weeks of Winter:</b>	<b>32</b>
<b>Weeks of Summer:</b>	<b>20</b>

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PRES STOP:</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>
<b>REQ START:</b>	<b>0</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>7</b>	<b>9</b>	<b>0</b>
<b>REQ STOP:</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>15</b>	<b>18</b>	<b>0</b>

**INPUTS**

<b>Motor HP:</b>	<b>5.00</b>
<b>HP Effic:</b>	<b>0.82</b>
<b>Load Factor:</b>	<b>0.80</b>
<b>CFM-HTG:</b>	<b>12,200</b>
<b>CFM-CLG:</b>	<b>0</b>
<b>%OA:</b>	<b>100%</b>
<b>%Area:</b>	<b>10%</b>
<b>CHILLER CAP (TONS):</b>	<b>0</b>
<b>KW-TON:</b>	<b>0.00</b>
<b>BLR CAP INPUT (BTUH):</b>	<b>0</b>
<b>BLR CAP OUTPUT (BTUH):</b>	<b>0</b>

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	<b>880</b>	<b>3,360</b>
<b>HTG HRS ON:</b>	<b>1,408</b>	<b>5,376</b>
<b>H/C HRS ON:</b>	<b>2,294</b>	<b>8,760</b>
<b>CLG HRS SAVED:</b>	<b>2,480</b>	
<b>HTG HRS SAVED:</b>	<b>3,968</b>	
<b>C/H HRS SAVED:</b>	<b>6,466</b>	

**CONSTANTS**

<b>HOAUHC:</b>	<b>0</b>
<b>HOAUH:</b>	<b>0</b>
<b>COAUHC:</b>	<b>0</b>
<b>COAUC:</b>	<b>0</b>
<b>HOAOHC:</b>	<b>0</b>
<b>HOAOH:</b>	<b>0</b>
<b>COAOHC:</b>	<b>0</b>
<b>COAOC:</b>	<b>0</b>
<b>DC DUTY:</b>	<b>0.17</b>
<b>DC DEMAND:</b>	<b>0.17</b>
<b>ECC:</b>	<b>0</b>
<b>ECHC:</b>	<b>0</b>
<b>NSUHC:</b>	<b>0</b>
<b>NSUCC:</b>	<b>0</b>
<b>DDCCHC:</b>	<b>0.0000199</b>
<b>DDCCC:</b>	<b>0.0000526</b>
<b>NSC:</b>	<b>0</b>
<b>DDCH:</b>	<b>64800</b>
<b>OPT:</b>	<b>305</b>
<b>CHWR:</b>	<b>17.5</b>
<b>CNWR:</b>	<b>0</b>
<b>OAR:</b>	<b>5.67</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG****ENERGY CALCULATION SUMMARY**

System Type:	16
System Name:	Heating and Ventilating Unit
System Number:	MAU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	14,510.43	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	15,625.77	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	76.39	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>15,625.77</b>	<b>76.39</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>1</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>\$1,433.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS**

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

Building UA: 11,789

CONDITIONED SQFT: 27,112

**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	24%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,794.02	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	266.81	
Sub Total	0.00	1,931.91	266.81	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,931.91</b>	<b>266.81</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

**ENERGY CALCULATION PARAMETERS****BLDG: 7520****BUILDING NAME: VEH MNT SHOP ORG**

Building UA:	11,789	CONDITIONED SQFT:	27,112
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**SYSTEM INFORMATION**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
13	METAL PANEL AND CMU	VEH MAINT SHOP	0700-1800	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	9	9	9	7	9	0
REQ STOP:	0	18	18	18	15	18	0

**INPUTS**

Motor HP:	0.33
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	16%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	880	3,360
HTG HRS ON:	1,408	5,376
H/C HRS ON:	2,294	8,760
CLG HRS SAVED:	2,480	
HTG HRS SAVED:	3,968	
C/H HRS SAVED:	6,466	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000105
NSUCC:	0.000278
DDCCHC:	0.000161
DDCCC:	0.000426
NSC:	94300
DDCH:	40600
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: JMAJN/AMS

BLDG: 7520

BUILDING NAME: VEH MNT SHOP ORG

**ENERGY CALCULATION SUMMARY**

System Type:	20
System Name:	Infrared Radiant Heaters
System Number:	RAD-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,202.27	0.00	
Opt ST/SP	0.00	92.41	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	177.87	
Sub Total	0.00	1,294.68	177.87	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				0.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,294.68</b>	<b>177.87</b>	<b>0.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
20	Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip	1	0	1	2	\$1,213.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>\$1,213.00</b>

**BUILDING 7602**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7602 BUILDING NAME: ADMIN & SUPPORT BLDG  
 Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUHC:	0.000226
NSUC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,326.60	0.00	
Sub Total	0.35	2,531.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	46.81	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,578.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7602 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,326.60	0.00	
Sub Total	0.35	2,531.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	46.81	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,578.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7602****BUILDING NAME: ADMIN & SUPPORT BLDG****Building UA: 4,753****CONDITIONED SQFT: 13,520****SYSTEM INFORMATION****System Type: 15****System Name: Small Single Zone air handling unit****System Number: AHU-3****TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
<b>Weeks of Winter:</b>		32		
<b>Weeks of Summer:</b>		20		

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,326.60	0.00	
Sub Total	0.35	2,531.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	46.81	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,578.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7602 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-4

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,326.60	0.00	
Sub Total	0.35	2,531.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	46.81	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,578.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7602 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,067.01	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,326.60	0.00	
Sub Total	0.35	2,531.51	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	46.81	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,578.32</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7602****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA: 4,753

CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 1

System Name: Small hot water boiler

System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter: 32

Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,000,000
BLR CAP OUTPUT (BTUH):	800,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 1  
System Name: Small hot water boiler  
System Number: BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.67	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.67</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7602****BUILDING NAME: ADMIN & SUPPORT BLDG****Building UA: 4,753****CONDITIONED SQFT: 13,520****SYSTEM INFORMATION****System Type: 6****System Name: Small air cooled chiller****System Number: CH-1****TYPICAL BUILDING INFORMATION**

<b>Category Number:</b>	<b>Construction:</b>	<b>Use:</b>	<b>Occupancy HRS:</b>	<b>Occupancy Days:</b>
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	<b>SUN:</b>	<b>MON:</b>	<b>TUE:</b>	<b>WED:</b>	<b>THUR:</b>	<b>FRI:</b>	<b>SAT:</b>
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	7	7	7	7	7	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	1.00
<b>HP Effic:</b>	0.69
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	15
<b>KW-TON:</b>	1.10
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<b>REQUIRED HR/YR</b>	<b>PRESENT HR/YR</b>
<b>CLG HRS ON:</b>	1,000	3,360
<b>HTG HRS ON:</b>	1,600	5,376
<b>H/C HRS ON:</b>	2,607	8,760
<b>CLG HRS SAVED:</b>	2,360	
<b>HTG HRS SAVED:</b>	3,776	
<b>C/H HRS SAVED:</b>	6,153	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000226
<b>NSUCC:</b>	0.000598
<b>DDCCHC:</b>	0.0000188
<b>DDCCC:</b>	0.0000498
<b>NSC:</b>	93100
<b>DDCH:</b>	29900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 6  
System Name: Small air cooled chiller  
System Number: CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,035.33	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	2,298.37	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	262.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	12.62	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>13.28</b>	<b>2,560.87</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7602 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,000	3,360
HTG HRS ON:	1,600	5,376
H/C HRS ON:	2,607	8,760
CLG HRS SAVED:	2,360	
HTG HRS SAVED:	3,776	
C/H HRS SAVED:	6,153	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7602

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,560.81	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	2,767.66	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>2,767.66</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>

**BUILDING 7604**  
**GENERAL INSTRUCTION BUILDING**



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7604****BUILDING NAME: GEN INST BLDG**

Building UA:	3,640	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	21 BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	15	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	6,000
CFM-CLG:	6,000
%OA:	15%
%Area:	45%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,440	3,360
HTG HRS ON:	2,304	5,376
H/C HRS ON:	3,754	8,760
CLG HRS SAVED:	1,920	
HTG HRS SAVED:	3,072	
C/H HRS SAVED:	5,006	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7604

BUILDING NAME: GEN INST BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	18,305.21	95.06	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	6,637.58	49.96	
Sub Total	7.46	26,058.13	145.02	
Economizer	0.00	1,766.02	0.00	
Ventilation/Recirculation	0.00	0.00	5.79	
DDC Control	0.00	2,070.11	52.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>29,894.26</b>	<b>203.06</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7604

BUILDING NAME: GEN INST BLDG

Building UA: 3,640

CONDITIONED SQFT: 13,493

**SYSTEM INFORMATION**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	15	0

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	6,000
CFM-CLG:	6,000
%OA:	15%
%Area:	45%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,440	3,360
HTG HRS ON:	2,304	5,376
H/C HRS ON:	3,754	8,760
CLG HRS SAVED:	1,920	
HTG HRS SAVED:	3,072	
C/H HRS SAVED:	5,006	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7604

BUILDING NAME: GEN INST BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	10
System Name:	Multizone air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	18,305.21	95.06	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	7.46	0.00	0.00	
Night Setback	0.00	6,637.58	49.96	
Sub Total	7.46	26,058.13	145.02	
Economizer	0.00	1,766.02	0.00	
Ventilation/Recirculation	0.00	0.00	5.79	
DDC Control	0.00	2,070.11	52.25	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>7.46</b>	<b>29,894.26</b>	<b>203.06</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
29	Direct digital control - MZ AHU	0	7	0	8	\$3,378.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
35	Outside air damper economizer control - MZ AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>\$4,509.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7604	BUILDING NAME: GEN INST BLDG
Building UA: 3,640	CONDITIONED SQFT: 13,493

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	15	0

**INPUTS**

Motor HP:	2.00
HP Effc:	0.78
Load Factor:	0.80
CFM-HTG:	2,000
CFM-CLG:	2,000
%OA:	15%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,440	3,360
HTG HRS ON:	2,304	5,376
H/C HRS ON:	3,754	8,760
CLG HRS SAVED:	1,920	
HTG HRS SAVED:	3,072	
C/H HRS SAVED:	5,006	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7604

BUILDING NAME: GEN INST BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	7,660.03	31.69	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	3.12	0.00	0.00	
Night Setback	0.00	2,212.53	11.10	
Sub Total	3.12	10,339.28	42.79	
Economizer	0.00	588.67	0.00	
Ventilation/Recirculation	0.00	0.00	1.93	
DDC Control	0.00	690.04	11.61	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>3.12</b>	<b>11,617.99</b>	<b>56.33</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7604

BUILDING NAME: GEN INST BLDG

Building UA: 3,640

CONDITIONED SQFT: 13,493

**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	23	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.71
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	877,000
BLR CAP OUTPUT (BTUH):	648,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,600	3,360
HTG HRS ON:	2,560	5,376
H/C HRS ON:	4,171	8,760
CLG HRS SAVED:	1,760	
HTG HRS SAVED:	2,816	
C/H HRS SAVED:	4,589	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7604****BUILDING NAME: GEN INST BLDG****ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,734.05	0.00	
Opt ST/SP	0.00	512.74	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	5,246.80	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	4.97	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>5,246.80</b>	<b>4.97</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7604

BUILDING NAME: GEN INST BLDG

Building UA:	3,640	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	15	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,440	3,360
HTG HRS ON:	2,304	5,376
H/C HRS ON:	3,754	8,760
CLG HRS SAVED:	1,920	
HTG HRS SAVED:	3,072	
C/H HRS SAVED:	5,006	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7604

BUILDING NAME: GEN INST BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,938.09	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	1.17	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	1.17	3,404.82	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>60.08</b>	<b>4,629.82</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7604

BUILDING NAME: GEN INST BLDG

Building UA:	3,640	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	26
System Name:	Pump
System Number:	HWP-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
21	BRICK AND CMU	TRAINING	0700-2100	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	7	7	7	7	7	0
REQ STOP:	0	23	23	23	23	23	0

**INPUTS**

Motor HP:	2.00
HP Effic:	0.78
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,600	3,360
HTG HRS ON:	2,560	5,376
H/C HRS ON:	4,171	8,760
CLG HRS SAVED:	1,760	
HTG HRS SAVED:	2,816	
C/H HRS SAVED:	4,589	

**CONSTANTS**

HOAUHC:	21.1
HOAUH:	34
COAUHC:	0
COAUC:	0
HOAOHC:	17.3
HOAOH:	27.9
COAOHC:	0.000885
COAOC:	0.00234
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000207
ECHC:	0.0000784
NSUCHC:	0.000221
NSUCC:	0.000584
DDCCHC:	0.0000919
DDCCC:	0.000243
NSC:	30500
DDCH:	31900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7604****BUILDING NAME: GEN INST BLDG****ENERGY CALCULATION SUMMARY**

System Type:	26
System Name:	Pump
System Number:	HWP-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	4,309.20	0.00	
Opt ST/SP	0.00	466.73	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	4,775.93	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>4,775.93</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
24	Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump	1	0	1	0	\$386.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>\$386.00</b>

**BUILDING 7606**  
**ENLISTED PERSONNEL DINING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7606 BUILDING NAME: ENL PERS DIN  
Building UA: 2,454 CONDITIONED SQFT: 13,493

**SYSTEM INFORMATION**

System Type: 11  
System Name: Variable Air Volume air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
11 BRICK AND CMU MESS HALL - DINING AREA 0600-2000 M-F, SAT-SUN

Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,000
CFM-CLG:	7,000
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	28.4
HOAUH:	45.6
COAUHC:	0.000623
COAUC:	0.00165
HOAOHC:	33.9
HOAOH:	54.4
COAOHC:	0.0006483
COAOC:	0.00171
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000208
ECHC:	0.0000788
NSUCHC:	0.000261
NSUCC:	0.000691
DDCCHC:	0.00018
DDCCC:	0.000476
NSC:	57200
DDCH:	22500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,896.48	115.06	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	3,524.80	49.13	
Sub Total	4.62	11,112.52	164.19	
Economizer	0.00	3,767.82	0.00	
Ventilation/Recirculation	0.00	399.03	18.19	
DDC Control	0.00	8,606.70	19.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>23,886.07</b>	<b>201.71</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7606****BUILDING NAME: ENL PERS DIN**

Building UA:	2,454	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
11	BRICK AND CMU	MESS HALL - DINING AREA	0600-2000	M-F, SAT-SUN
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	3.00
HP Effic:	0.79
Load Factor:	0.80
CFM-HTG:	7,250
CFM-CLG:	7,250
%OA:	30%
%Area:	35%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	28.4
HOAUH:	45.6
COAUHC:	0.000623
COAUC:	0.00165
HOAOHC:	33.9
HOAOH:	54.4
COAOHC:	0.0006483
COAOC:	0.00171
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000208
ECHC:	0.0000788
NSUCHC:	0.000261
NSUCC:	0.000691
DDCCHC:	0.00018
DDCCC:	0.000476
NSC:	57200
DDCH:	22500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	11
System Name:	Variable Air Volume air handling unit
System Number:	AHU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,986.63	119.17	
Opt ST/SP	0.00	691.23	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	4.62	0.00	0.00	
Night Setback	0.00	3,650.69	49.13	
Sub Total	4.62	11,328.55	168.30	
Economizer	0.00	3,902.39	0.00	
Ventilation/Recirculation	0.00	413.28	18.84	
DDC Control	0.00	8,914.08	19.33	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				5.00
<b>TOTAL</b>	<b>4.62</b>	<b>24,558.30</b>	<b>206.47</b>	<b>5.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
32	Direct digital control - VAV AHU	0	3	0	11	\$3,695.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
40	Maintenance (filter) alarm - AHU	0	0	1	0	\$112.00
<b>TOTAL:</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>\$4,826.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7606 BUILDING NAME: ENL PERS DIN  
Building UA: 2,454 CONDITIONED SQFT: 13,493

**SYSTEM INFORMATION**

System Type: 3  
System Name: Small steam boiler  
System Number: BLR-1

**TYPICAL BUILDING INFORMATION**

Catagory Number: Construction: Use: Occupancy HRS: Occupancy Days:  
12 BRICK AND CMU MESS HALL - KITCHEN ARE 0500-2400 M-F; SAT-SUN  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	0	0	0	0	0	0
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	8,625,000
BLR CAP OUTPUT (BTUH):	6,900,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	3,360	3,360
HTG HRS ON:	5,376	5,376
H/C HRS ON:	8,760	8,760
CLG HRS SAVED:	0	
HTG HRS SAVED:	0	
C/H HRS SAVED:	0	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 09-Dec-95  
PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	3
System Name:	Small steam boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	0.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
7	Steam Boiler Monitoring	1	0	3	1	\$1,015.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>\$1,015.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7606

BUILDING NAME: ENL PERS DIN

Building UA:	2,454	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
11	BRICK AND CMU	MESS HALL - DINING AREA	0600-2000	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	5.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	0%
CHILLER CAP (TONS):	70
KW-TON:	1.10
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	28.4
HOAUH:	45.6
COAUHC:	0.000623
COAUC:	0.00165
HOAOHC:	33.9
HOAOH:	54.4
COAOHC:	0.0006483
COAOC:	0.00171
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0.000208
ECHC:	0.0000788
NSUHC:	0.000261
NSUCC:	0.000691
DDCCHC:	0.00018
DDCCC:	0.000476
NSC:	57200
DDCH:	22500
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	6
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,706.08	0.00	
Opt ST/SP	0.00	1,115.34	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	2.80	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	2.80	3,821.42	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	1,225.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	58.91	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>61.70</b>	<b>5,046.42</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7606****BUILDING NAME: ENL PERS DIN**

Building UA:	2,454	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	0.75
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	17%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	2,000,000
BLR CAP OUTPUT (BTUH):	2,000,000

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	5
System Name:	Steam to hot water converter
System Number:	CV-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	802.97	0.00	
Opt ST/SP	0.00	206.85	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,009.81	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	11.34	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,009.81</b>	<b>11.34</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
8	Scheduled start/stop control - STM- HW Cnvrtr; Optimum start/stop control - STM-HW Cnvrtr; Night setback - STM-HW Cnvrtr	1	0	1	0	\$386.00
9	Hot water reset - STM-HW Converter	0	1	0	3	\$1,109.00
<b>TOTAL:</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>\$1,495.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7606

BUILDING NAME: ENL PERS DIN

Building UA:	2,454	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-1

**TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F, SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	8.00
HP Effic:	0.82
Load Factor:	0.80
CFM-HTG:	11,400
CFM-CLG:	0
%OA:	100%
%Area:	20%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7606****BUILDING NAME: ENL PERS DIN****ENERGY CALCULATION SUMMARY**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	6,927.56	0.00	
Opt ST/SP	0.00	1,784.55	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	146.06	
Sub Total	0.00	8,712.11	146.06	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	1.42	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>8,712.11</b>	<b>147.48</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>\$1,782.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7606

BUILDING NAME: ENL PERS DIN

Building UA:	2,454	CONDITIONED SQFT:	13,493
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**SYSTEM INFORMATION**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
12	BRICK AND CMU	MESS HALL - KITCHEN ARE	0500-2400	M-F; SAT-SUN

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	6	5	5	5	5	5	6
REQ STOP:	24	24	24	24	24	24	24

**INPUTS**

Motor HP:	2.50
HP Effic:	0.74
Load Factor:	0.80
CFM-HTG:	3,600
CFM-CLG:	0
%OA:	100%
%Area:	10%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0
NSUCC:	0
DDCCHC:	0.00000209
DDCCC:	0.00000552
NSC:	992000
DDCH:	9640
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	2,620	3,360
HTG HRS ON:	4,192	5,376
H/C HRS ON:	6,831	8,760
CLG HRS SAVED:	740	
HTG HRS SAVED:	1,184	
C/H HRS SAVED:	1,929	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS

EMC NO: 1406-001

CLIENT CNTRCT #: DACA 01-94-D-0033

DATE: 16-Sep-95

LOCATION: FT. RILEY, KS

PREPARED BY: AJN/CWW

BLDG: 7606

BUILDING NAME: ENL PERS DIN

**ENERGY CALCULATION SUMMARY**

System Type:	17
System Name:	Heating and Ventilating Unit with Return Fa
System Number:	HRU-2

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	2,387.20	0.00	
Opt ST/SP	0.00	614.95	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	73.03	
Sub Total	0.00	3,002.15	73.03	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.71	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>3,002.15</b>	<b>73.74</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
19	Scheduled start/stop control - AHU w/ RF; Optimum start/stop - AHU w/ RF; Demand limiting - AHU w/ RF; Duty Cycling - AHU w/ RF	2	0	0	2	\$697.00
30	Direct digital control - H&V Unit	0	1	0	3	\$813.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
<b>TOTAL:</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>\$1,782.00</b>

**BUILDING 7608**  
**ADMINISTRATION & SUPPLY BUILDING**

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7608****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,021.79	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,270.39	0.00	
Sub Total	0.35	2,430.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	51.49	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,481.58</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA: 4,753

CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-2

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7608****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-2

FUNCTION	KW/yr	KWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,021.79	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,270.39	0.00	
Sub Total	0.35	2,430.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	51.49	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,481.58</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608	BUILDING NAME: ADMIN & SUPPORT BLDG
Building UA: 4,753	CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15
System Name: Small Single Zone air handling unit
System Number: AHU-3

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F

Weeks of Winter:	32
Weeks of Summer:	20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 15  
 System Name: Small Single Zone air handling unit  
 System Number: AHU-3

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,021.79	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,270.39	0.00	
Sub Total	0.35	2,430.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	51.49	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,481.58</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608 BUILDING NAME: ADMIN & SUPPORT BLDG  
Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

**TYPICAL BUILDING INFORMATION**

Category Number: Construction: Use: Occupancy HRS: Occupancy Days:  
3 BRICK AND CMU ADMIN & SUPPLY 0700-1600 M-F  
Weeks of Winter: 32  
Weeks of Summer: 20

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**BLDG: 7608****BUILDING NAME: ADMIN & SUPPORT BLDG****ENERGY CALCULATION SUMMARY**

System Type: 15  
System Name: Small Single Zone air handling unit  
System Number: AHU-4

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,021.79	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,270.39	0.00	
Sub Total	0.35	2,430.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	51.49	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,481.58</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7608****BUILDING NAME: ADMIN & SUPPORT BLDG**

Building UA:	4,753	CONDITIONED SQFT:	13,520
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**SYSTEM INFORMATION**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3 BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.66
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	940
%OA:	20%
%Area:	0%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	15
System Name:	Small Single Zone air handling unit
System Number:	AHU-5

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,021.79	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.35	0.00	0.00	
Night Setback	0.00	1,270.39	0.00	
Sub Total	0.35	2,430.08	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	51.49	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.35</b>	<b>2,481.58</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
18	Scheduled start/stop control - AHU; Optimum start/stop - AHU; Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU	1	0	0	1	\$348.00
27	Direct digital control - Small SZ AHU	0	2	0	3	\$1,097.00
33	Outside air damper ventilation and recirculation control - AHU	0	1	0	0	\$272.00
36	Outside air damper economizer control - AHU	0	0	0	2	\$399.00
<b>TOTAL:</b>		<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>\$2,116.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

Building UA:	4,753	CONDITIONED SQFT:	13,520
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**SYSTEM INFORMATION**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.00
HP Effic:	0.00
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	1,000,000
BLR CAP OUTPUT (BTUH):	800,000

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.0000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	1
System Name:	Small hot water boiler
System Number:	BLR-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	.00	0.00	
Opt ST/SP	0.00	0.00	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	0.00	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	5.67	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>5.67</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
1	Scheduled start/stop control - HW Boiler; Optimum start/stop control - HW Boiler; Night setback - HW Boiler	2	0	0	0	\$277.00
2	Hot water reset - HW Boiler	0	0	0	3	\$836.00
4	Alarms - HW Boiler	0	0	2	0	\$330.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>\$1,443.00</b>



**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
DATE: 16-Sep-95  
PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS****BLDG: 7608****BUILDING NAME: ADMIN & SUPPORT BLDG****Building UA: 4,753****CONDITIONED SQFT: 13,520****SYSTEM INFORMATION****System Type: 6****System Name: Small air cooled chiller****System Number: CH-1****TYPICAL BUILDING INFORMATION**

Catagory Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
<b>Weeks of Winter:</b>	32			
<b>Weeks of Summer:</b>	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
<b>PRES START:</b>	0	0	0	0	0	0	0
<b>PRES STOP:</b>	24	24	24	24	24	24	24
<b>REQ START:</b>	0	6	6	6	6	6	0
<b>REQ STOP:</b>	0	17	17	17	17	17	0

**INPUTS**

<b>Motor HP:</b>	1.00
<b>HP Effic:</b>	0.69
<b>Load Factor:</b>	0.80
<b>CFM-HTG:</b>	0
<b>CFM-CLG:</b>	0
<b>%OA:</b>	0%
<b>%Area:</b>	0%
<b>CHILLER CAP (TONS):</b>	15
<b>KW-TON:</b>	1.10
<b>BLR CAP INPUT (BTUH):</b>	0
<b>BLR CAP OUTPUT (BTUH):</b>	0

**HOURS CALCULATIONS**

	<u>REQUIRED</u> HR/YR	<u>PRESENT</u> HR/YR
<b>CLG HRS ON:</b>	1,100	3,360
<b>HTG HRS ON:</b>	1,760	5,376
<b>H/C HRS ON:</b>	2,868	8,760
<b>CLG HRS SAVED:</b>	2,260	
<b>HTG HRS SAVED:</b>	3,616	
<b>C/H HRS SAVED:</b>	5,892	

**CONSTANTS**

<b>HOAUHC:</b>	0
<b>HOAUH:</b>	0
<b>COAUHC:</b>	0
<b>COAUC:</b>	0
<b>HOAOHC:</b>	0
<b>HOAOH:</b>	0
<b>COAOHC:</b>	0
<b>COAOC:</b>	0
<b>DC DUTY:</b>	0.17
<b>DC DEMAND:</b>	0.17
<b>ECC:</b>	0
<b>ECHC:</b>	0
<b>NSUCHC:</b>	0.000226
<b>NSUCC:</b>	0.000598
<b>DDCCHC:</b>	0.0000188
<b>DDCCC:</b>	0.0000498
<b>NSC:</b>	93100
<b>DDCH:</b>	29900
<b>OPT:</b>	305
<b>CHWR:</b>	17.5
<b>CNWR:</b>	0
<b>OAR:</b>	5.67

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type:	5
System Name:	Small air cooled chiller
System Number:	CH-1

FUNCTION	KW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,949.09	0.00	
Opt ST/SP	0.00	263.04	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.66	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.66	2,212.13	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	262.50	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	12.62	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				4.00
<b>TOTAL</b>	<b>13.28</b>	<b>2,474.63</b>	<b>0.00</b>	<b>4.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTN NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
10	Scheduled start/stop control - Chiller; Optimum start/stop control - Chiller; Demand limiting - Chiller; Night Setback - Chiller	1	0	1	0	\$386.00
11	Chilled water reset - Small Air Cooled Chiller	0	0	0	2	\$664.00
16	Alarms - Chiller	0	0	2	0	\$281.00
42	Chiller demand limiting - Small Air Cooled Chiller	1	0	0	0	\$150.00
<b>TOTAL:</b>		<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>\$1,481.00</b>

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
 CLIENT CNTRCT #: DACA 01-94-D-0033  
 LOCATION: FT. RILEY, KS

EMC NO: 1406-001  
 DATE: 16-Sep-95  
 PREPARED BY: AJN/CWW

**ENERGY CALCULATION PARAMETERS**

BLDG: 7608 BUILDING NAME: ADMIN & SUPPORT BLDG  
 Building UA: 4,753 CONDITIONED SQFT: 13,520

**SYSTEM INFORMATION**

System Type: 25  
 System Name: Hot water radiation pump  
 System Number: RAD-1

**TYPICAL BUILDING INFORMATION**

Category Number:	Construction:	Use:	Occupancy HRS:	Occupancy Days:
	3BRICK AND CMU	ADMIN & SUPPLY	0700-1600	M-F
Weeks of Winter:	32			
Weeks of Summer:	20			

**SYSTEM OPERATING SCHEDULE**

	SUN:	MON:	TUE:	WED:	THUR:	FRI:	SAT:
PRES START:	0	0	0	0	0	0	0
PRES STOP:	24	24	24	24	24	24	24
REQ START:	0	6	6	6	6	6	0
REQ STOP:	0	17	17	17	17	17	0

**INPUTS**

Motor HP:	0.50
HP Effic:	0.65
Load Factor:	0.80
CFM-HTG:	0
CFM-CLG:	0
%OA:	0%
%Area:	100%
CHILLER CAP (TONS):	0
KW-TON:	0.00
BLR CAP INPUT (BTUH):	0
BLR CAP OUTPUT (BTUH):	0

**CONSTANTS**

HOAUHC:	0
HOAUH:	0
COAUHC:	0
COAUC:	0
HOAOHC:	0
HOAOH:	0
COAOHC:	0
COAOC:	0
DC DUTY:	0.17
DC DEMAND:	0.17
ECC:	0
ECHC:	0
NSUCHC:	0.000226
NSUCC:	0.000598
DDCCHC:	0.000188
DDCCC:	0.0000498
NSC:	93100
DDCH:	29900
OPT:	305
CHWR:	17.5
CNWR:	0
OAR:	5.67

**HOURS CALCULATIONS**

	REQUIRED HR/YR	PRESENT HR/YR
CLG HRS ON:	1,100	3,360
HTG HRS ON:	1,760	5,376
H/C HRS ON:	2,868	8,760
CLG HRS SAVED:	2,260	
HTG HRS SAVED:	3,616	
C/H HRS SAVED:	5,892	

**EMC ENGINEERS, INC.**

PROJECT NAME: EEAP, FEASIBILITY STUDY FOR INSTALLATION OF UMCS  
CLIENT CNTRCT #: DACA 01-94-D-0033  
LOCATION: FT. RILEY, KS

EMC NO: 1406-001

DATE: 16-Sep-95

PREPARED BY: AJN/CWW

BLDG: 7608

BUILDING NAME: ADMIN &amp; SUPPORT BLDG

**ENERGY CALCULATION SUMMARY**

System Type: 25  
System Name: Hot water radiation pump  
System Number: RAD-1

FUNCTION	kW/yr	kWh/yr	MBtu/yr	MH/yr
Schedule ST/SP	0.00	1,634.87	0.00	
Opt ST/SP	0.00	137.90	0.00	
Duty Cycle	0.00	0.00	0.00	
Demand Limit	0.00	0.00	0.00	
Night Setback	0.00	0.00	0.00	
Sub Total	0.00	1,772.77	0.00	
Economizer	0.00	0.00	0.00	
Ventilation/Recirculation	0.00	0.00	0.00	
DDC Control	0.00	0.00	0.00	
HW OA Reset	0.00	0.00	0.00	
Chilled Water Reset	0.00	0.00	0.00	
Condenser Water Reset	0.00	0.00	0.00	
Chiller Demand Limit	0.00	0.00	0.00	
Remote Monitoring, Maintenance, Run Time, and Safety Alarms				3.00
<b>TOTAL</b>	<b>0.00</b>	<b>1,772.77</b>	<b>0.00</b>	<b>3.00</b>

**TYPICAL SYSTEM POINT AND COST SUMMARY**

UMCS FUNCTION NO.	UMCS APPLICATION	DO POINTS	AO POINTS	DI POINTS	AI POINTS	COST
23	Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump; Night setback - HW Pump	1	0	1	1	\$570.00
<b>TOTAL:</b>		<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>\$570.00</b>